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THE RADIO AMATEUR'S JOURNAL

KENWOOD

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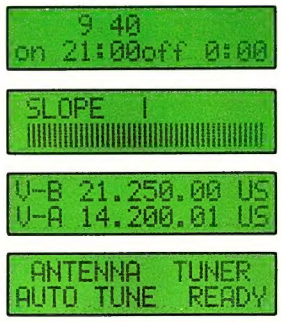
NEW!

"DX-cellence!"

TS-940S

The new TS-940S is a serious radio for the serious operator. Superb interference reduction circuits and high dynamic range receiver combine with superior transmitter design to give you no-nonsense, no compromise performance that gets your signals through! The exclusive multi-function LCD sub display graphically illustrates VBT, SSB slope, and other features.

- **100% duty cycle transmitter.** Super efficient cooling system using special air ducting works with the internal heavy-duty power supply to allow continuous transmission at full power output for periods exceeding one hour.
- **Programmable scanning.**
- **Semi or full break-in (QSK) CW.**
- **Low distortion transmitter.** Kenwood's unique transmitter design delivers top "quality Kenwood" sound.
- **Keyboard entry frequency selection.** Operating frequencies may be directly entered into the TS-940S without using the VFO knob.
- **Graphic display of operating features.** Exclusive multi-function LCD sub-display panel shows CW VBT, SSB slope tuning, as well as frequency, time, and AT-940 antenna tuner status.
- **QRM-fighting features.** Remove "rotten QRM" with the SSB slope tuning, CW VBT, notch filter, AF tune, and CW pitch controls.
- **Built-in FM, plus SSB, CW, AM, FSK.**



Optional accessories:

• AT-940 full range (160-10 m) automatic antenna tuner • SP-940 external speaker with audio filtering • YG-455C-1 (500 Hz), YG-455CN-1 (250 Hz), YK-88C-1 (500 Hz) CW filters; YK-88A-1 (6 kHz) AM filter • VS-1 voice synthesizer • SO-1 temperature compensated crystal oscillator • MC-42S UP/DOWN hand mic. • MC-60A, MC-80, MC-85 deluxe base station mics. • PC-1A phone patch • TL- 922A linear amplifier • SM-220 station monitor • BS-8 pan display • SW-200A and SW-2000 SWR and power meters.

- **High stability, dual digital VFOs.** An optical encoder and the flywheel VFO knob give the TS-940S a positive tuning "feel."
- **40 memory channels.** Mode and frequency may be stored in 4 groups of 10 channels each.
- **General coverage receiver.** Tunes from 150 kHz to 30 MHz.
- **1 yr. limited warranty.** Another Kenwood First.

More TS-940S information is available from authorized Kenwood dealers.

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Complete service manuals are available for all Trio-Kenwood transceivers and most accessories. Specifications and prices are subject to change without notice or obligation.

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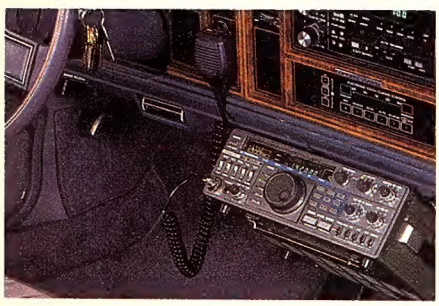
"Digital DX-terity!"

TS-430S

Digital DX-terity—that outstanding attribute built into every Kenwood TS-430S lets you QSY from band to band, frequency to frequency and mode to mode with the speed and ease that will help you earn that dominant DX position from the shack or from the mobile!



- **Covers all Amateur bands**
  160 through 10 meters, as well as the new 30, 17, and 12 meter WARC bands. High dynamic range, general coverage receiver tunes from 150 kHz to 30 MHz. Easily modified for HF MARS operation.
- **Superb interference reduction**
  Eliminate QRM with the IF shift and tuneable notch filter. A noise blanker supresses ignition noise. Squelch, RF attenuator, and RIT are also provided. Optional IF filters may be added for optimum interference reduction.
- **Reliable, all solid state design.**
  Solid state design permits input power of 250 watts PEP on SSB, 200 watts DC on CW, 120 watts on FM (optional), or 60 watts on AM. Final amplifier protection circuits and a cooling fan are built-in.
- **Memory channels.**
  Eight memory channels store frequency, mode and band data. Channel 8 may be programmed for split-frequency operation. A front panel switch allows each memory channel to operate as an independent VFO or as a fixed frequency. A lithium battery backs up stored information.
- **Programmable, multi-function scan.**
- **Speech processor built-in.**
- **Dual digital VFOs.**
- **VOX circuit, plus semi break-in with sidetone.**

Optional accessories:
• PS-430 compact AC power supply • SP-430 external speaker • MB-430 mobile mounting bracket • AT-130 compact antenna tuner covers 80-10 meters, incl. WARC bands • AT-250 automatic antenna tuner covers 160-10 meters, incl. WARC bands • TL-922A 2 kW PEP linear amplifier • FM-430 FM unit • YK-88C (500 Hz) or YK-88CN (270 Hz) CW filters • YK-88SN (1.8 kHz) narrow SSB filter • YK-88A (6 kHz) AM filter • MC-42S UP/DOWN hand mic. • MC-60A/80/85 deluxe desk mics. • SW-2000/200A SWR/power meters • SW-100A SWR/power/volt meter • PC-1A phone patch • HS-4, HS-5, HS-6, HS-7 headphones

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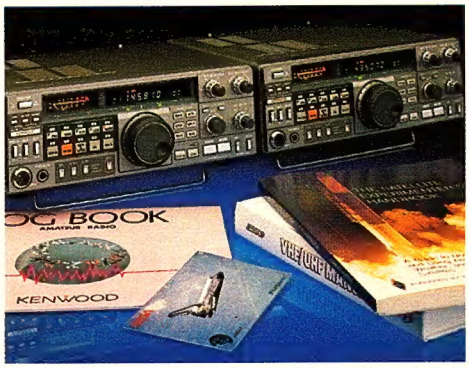
Matching Pair

TS-711A/TS-811A VHF/UHF all-mode base stations.

The TS-711A 2 meter and the TS-811A 70 centimeter all mode transceivers are the perfect rigs for your VHF and UHF operations. Both rigs feature Kenwood's new Digital Code Squelch (DCS) signaling system. Together, they form the perfect "matching pair" for satellite operation.

- **Highly stable dual digital VFOs.** The 10 Hz step, dual digital VFOs offer excellent stability through the use of a TCXO (Temperature Compensated Crystal Oscillator).
- **Large fluorescent multi-function display.** Shows frequency, RIT shift, VFO A/B, SPLIT, ALERT, repeater offset, digital code, and memory channel.
- **40 multi-function memories.** Stores frequency, mode, repeater offset, and CTCSS tone. Memories are backed up with a built-in lithium battery.



- **Versatile scanning functions.** Programmable band and memory scan (with channel lock-out). An "alert" function lets you listen for activity on your priority channel while listening on another frequency. **A Kenwood exclusive!**
- **RF power output control.** Continuously adjustable from 2 to 25 watts.
- **Automatic mode selection.** You may select the mode manually using the front panel mode keys. Manual mode selection is verified in International Morse Code.
- **All-mode squelch.**
- **High performance noise blanker.**
- **Speech processor.** For maximum efficiency on SSB and FM.
- **IF shift.**
- **"Quick-Step" tuning.** Vary the tuning characteristics from "conventional VFO feel" to a stepping action.
- **Built-in AC power supply.** Operation on 12 volts DC is also possible.
- **Semi break-in CW, with side tone.**
- **Optional voice synthesizer.**

More TS-711A/TS-811A information is available from authorized Kenwood dealers.

Optional accessories.

- CD-10 call sign display
- SP-430 external speaker
- VS-1 voice synthesizer
- TU-5 CTCSS tone unit
- MB-430 mobile mount
- PG-2J DC power cable
- MC-60A, MC-80, MC-85 deluxe desk top microphones
- MC-48 16-key DTMF, MC-42S UP/DOWN mobile hand microphones
- SW-200A/B SWR/power meters:
  SW-200A 1.8-150 MHz
  SW-200B 140-450 MHz
- SWT-1 2-m antenna tuner
- SWT-2 70-cm antenna tuner

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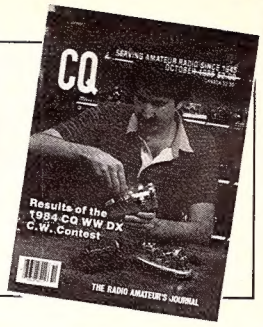
CQ The Radio Amateur's Journal



ON THE COVER: Keeping in a CW frame of mind, Neal McEwen, K5RW, displays some of his key collection for this CW Results issue. Photo by Larry Mulvehill, WB2ZPI.

OCTOBER 1985 **VOL. 41, NO. 10**

FEATURES

DEPARTMENTS

Zero Bias

AN EDITORIAL

The response to my past few editorials has been very gratifying. Many of you are now thinking about the problems that face amateur radio and our precarious future. Although suggestions abound, most still center on what someone else, some group, or the government can do to solve the problems. Apparently, we're still a long way from thinking in terms of I and me.

Extending the Novice privileges is a very good idea, deserving of our support, but in and of itself it means very little to a person who has nothing to which to relate *more* privileges, let alone existing privileges. It's still going to take more "hands on" teaching at the grass-roots level. Another extension suggested by several readers (for some future date) is 30 meters. Although it is a small piece of spectrum, it does offer a universal low-power requirement, world-wide coverage, and our all-time favorite, CW. It would provide a theoretically equal footing with all other amateurs who must use the same CW and power limitations.

I've had several suggestions of a "computer class" of license for those who are now involved with computers. Obviously, this idea was put forward with a no-code provision (the spark still lingers) and would involve the exchange of data (no talking or key-clicks to worry about). I seriously doubt that this would go a long way toward turning on someone to a DX pileup. If we altruistically wanted to enhance the state of the art in data transmission, we wouldn't need amateur radio for that. We simply could push for an extension of CB privileges to include data. Now that would really ruffle some feathers and wouldn't sit well with anyone.

There have been letters spelling out what the amateur radio magazines should do, what the amateur radio industry should do, what the ARRL should do, and what the FCC should do. Most are well intentioned. For the most part, people have begun to think beyond themselves and their own particular license and are now paying some attention to the great world out there. So, even though some ideas may be well intentioned, they are nevertheless a bit impractical and overgeneralized. The best sign of all, however, is that we are creating some movement towards the problem.

Now if we stop and think about it, a lot of the "should do" activity is being done and a lot of ideas are being tried out by the amateur radio magazines, the amateur radio industry, the ARRL, and the FCC. It's not enough, pure and simple. There's not enough time, money, and people to do the whole job. We can, with your help, get the wheels turning, create the interest, and explore all sorts of ways to stimulate growth in amateur radio. It's still up to you on an individual basis to determine for yourself just what you are willing to do for amateur radio. The volunteer examiner program showed a lot of skeptics (me included) that amateurs could gather and mobilize for the common good. Can we take it one step further?

I hope that by now we can accept the idea that demographics play a slim role in amateur radio. There really isn't a typical amateur or typical amateur activity. We can draw new amateurs from just about any group you can think of. If you check your amateur friends, you'll find that they have many different occupations, educational and social backgrounds, and a variety of life experiences and interests. That's the crux of the problem. There's no one handle on anything that large or varied. It's also the infinite beauty of amateur radio in that it truly has something for everyone. So, if we spend our time and efforts looking for the ultimate panacea, we're bound to failure and disappointment. What we have to do is think beyond the "who" or "what" groups of people, young or old, who might want to become amateurs and concentrate on similarities that all amateurs face. The only thing positive that can be achieved by appealing to groups is that it's easier to identify a member of a group, but it still doesn't make the criteria for the group correct. I believe that for a long time that kind of thinking stifled our growth, as evidenced by the rising median age.

When those of us of the median age group were drawn to amateur radio, there was a great similarity of interests and personality traits that hasn't existed since the early to mid 1950s. The youth gap plainly says that young people now simply do not identify or have the same aspirations as we did at their age. The magic is still there, but the approach is totally different. For us, amateur radio was a way of life. For young people today it is at best a part of life—a small part among many parts. Our job is to enhance that part and make that part attractive and desirable. That's done by being there to help, providing a good example and a demonstration of the fun and enjoyment that can be had from amateur radio. That's being people oriented, a thing we all profess to be. If we bring ourselves to do what we say we do, then half the battle is already won. On the other hand, if we're strictly looking to recreate ourselves at age 15, then look in the mirror. It's too late.

We are getting more Novices via the volunteer program. If we can concentrate on keeping their interest alive, encouraging their use of the Novice bands, and just becoming active to any degree, then we have a foothold on the next generation. They will do the proselytizing to their age group. The extended privileges for Novices or any other working program is at best six months to a year away. Your participation is as near as tomorrow. You have a better, nearer-in shot at making it work for all of us, right here and now. Each one of you holds the future of amateur radio within your grasp. Don't choke it.

Travels With CQ

The stalwart *CQ* travelers were at the Southwest Division Convention in Long Beach, California this past August at a most impressive setting. The Convention was held on the *R.M.S. Queen Mary,* now a floating hotel. In all honesty I must say the organizers for this event need a bit more organizing themselves. The one magnificent bit of organization was the choice of location. That couldn't have been better. Initially our booth was situated right next to the ARRL booth. While we are friends and all of that, it just isn't right to have us next to each other. The committee refused to move us, and it was through the kindness of AEA that we were able to switch booth space with them. The *Queen Mary* is also adjacent to "The Spruce Goose," the legendary seaplane built and flown by Howard Hughes. The plane is housed in a separate domed museum. Both the ship and the plane are superb attractions and well worth visiting. Since there was no fleamarket at the convention, we loaded up on posters and souvenirs to bring back. Norm Koch, K6ZDL, our WPX Award Manager, was there and spent some time at the booth helping out. He also brought me an old panel meter to bring home. He knew there wasn't going to be a fleamarket, and he didn't want me to go home empty-handed. Bill Welch, W6DDB, our Novice Editor, was there with his wife, and I enjoyed meeting them for the first time. I've talked to Bill for years on the phone, and it was nice to finally meet him. His group at the Lockheed ARC does have a followup program for amateur radio students to help get them on the air, and operating the club station is part of the Novice course. Lew McCoy, W1ICP, was there with his wife, Martha, and I think Lew's talk on antennas (what else) was the largest attended forum of the weekend. With a lot of *CQ* staffers there, Dick and I got a rare chance to get out and see all of the exhibits and new equipment. With Christmas coming up, I know that I've enlarged my wish list to include a few of the goodies that I saw there.

The next month or so will find us in Houston, Virginia Beach, Chicago, and Louisville, KY for the big events there. Get out there and mingle.

Silent Key

Several of you wrote in to find out what happened to our annual Christmas cover this year. Our covers were original paintings done by John Rogers, W2ADC, a world-noted watercolor artist. John was quite ill this past year and decided not to do the cover, as it wouldn't have been up to his high standards due to his health. We both hoped to see another cover in 1985, but that wasn't to be. John passed away in July. Of the 16 or so years I knew John, it was less than 8 that I knew he was a ham. The subject never came up. I grew to admire his talent and his wit and looked forward each year to his view of "CQville." We all will miss him.

73, Alan, K2EEK

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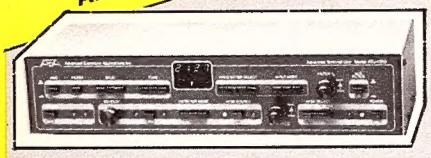

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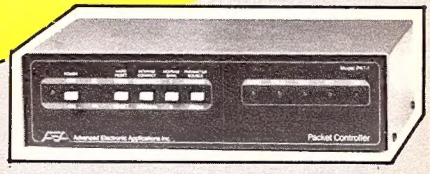

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AEA Brings You The BREAKTHROUGH

Our Readers Say:

One Is Not Enough!

Editor, *CQ:*

Ten meters is open, and there are many signals on 10 FM, all on 29.6, it seems. Just one simplex frequency on 10 FM? My ARRL Repeater Directory says so, but one is not enough.

How about using simplex on 29.59, 29.61, as well as 29.6? Even three simplex frequencies may not be enough, so when 10 is really busy, why not slip in between repeater *out*put frequencies? For example, 29.63. Just keep your deviation under control.

See you on 29.61 FM simplex!

Bud Moist, AE7K
Elko, NV

Where Do We Find New Amateurs?

Editor, *CQ:*

I just read your interesting Zero Bias on the question of where do we find new amateurs? How do we attract the younger people?

Well, I'm not a young person, not in age anyway. But as an amateur I am. I took a Novice class sponsored by our local ARC. It was a good class and we all had fun learning our new language and basic theory and rules. It was a small class and we had 100% pass. We all thank our instructors.

Got my ticket 12/21/84, and it is now 2/11/85. Without taking my blood pressure I think it has only dropped a few points lower on the Novice bands than it was on 11 meters.

As we new operators learned, we get 50 kHz of the 40 and 80 meter bands and 100 kHz of 15 and 10 meters. Well, you don't have to hold a General license to realize that 10 and 15 meters are dead now. During the night 80 comes in and 40 dies. That leaves us younger people with 50 kHz to operate most of the time.

Now comes the point of this letter. The people in Canada use about 30 kHz of the 80 meter band for phone. The Novices are now cut to 20 or 30 kHz to work.

When younger people ask about "amateur radio" and I try to show them what it's all about, and I can't talk code 8 miles to a fellow Novice (KA8VQT) because of our fellow members of the CRRL on phone on the only band we have in the evening, I don't think we are going to attract many young operators.

I asked an Extra class license holder about the problem, and of course his answer was to study real hard and upgrade and you won't have a problem. I'm not so narrow-minded so as not to agree with him, but I do enjoy code, and right now if I upgraded I probably wouldn't do as much code.

But your question was how to get younger people into ham radio. My suggestion is, don't let any new prospects hear our Novice bands. Thanks for hearing me out.

Jim Stone, KA8VQS
Luzerne, MI

A Unicorn Is The Answer

Editor, *CQ:*

This is just a brief note to congratulate you on the outstanding Editorial "Amateur Radio Needs a Unicorn," which appeared in the June issue of *CQ*. It is truly a masterpiece, and I think you have found the crux of the whole problem. Your Editorial should be required reading for ALL hams in the United States.

Pete Nissen, W4PTT
Jacksonville, FL

It Doesn't Have To Cost A Lot

Editor, *CQ:*

Just read your Editorial in the June issue of *CQ*. The thing that scares the kids away is the idea, actively promoted by *all* the magazines (who are supported by the manufacturers), that ham radio is and has to be a big money hobby.

If you want kids to come back, you have to let them know they can get on the air without the latest $2300 rig, and show them how to do it.

Rodney W. Gray
Belchertown, MA

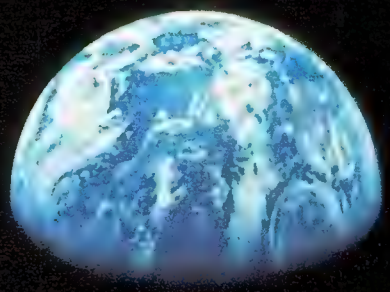
A Worthwhile Alternative

Editor, *CQ:*

Your editorial in the June issue raises several important points regarding the future of amateur radio. Amateur radio can be extremely rewarding to many older adults who are looking for an activity to become involved in. I raise this point because those trying to promote the field's growth sometimes forget its value for those involved in the Human Services either as a provider or recipient. Normally amateur radio is only considered in terms of its usefulness in a crises or emergency situation. However, it is a worthwhile alternate for people to consider who do not want to paint, jog, travel and/or spend a lot of time playing cards or bingo. Your readers' consideration would be appreciated in promoting this idea.

Dr. Robert Deitchman, Ph.D.
Outreach Coordinator/Human Services
Akron, Ohio

SPECTACULAR SIMPLICITY



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- Speech synthesis option for voice VFO
- Superior man machine interface—one knob and one button, program all of the features easily—alphanumeric LCD prompts
- 16 button speaker/mic with UP/DN lock-out switch

This radio does every single thing we asked the design staff to make it do, and it does it in an easy to use, simple manner. It is truly spectacular to operate such a radio in the 2 meter band. For example, the FM-240 has two VFO modes—one called VFO, the other QSY. So if you are on your favorite channel and want to QSY, simply push QSY and tune the main knob to the new frequency. To return, simply push QSY again. The entire radio follows this simple but spectacularly effective engineering formula. ONE BUTTON + ONE KNOB, SIMPLY SPECTACULAR SIMPLICITY.

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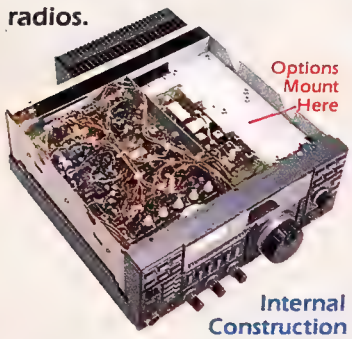

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Exceptional Standard Features:

- 143.800 – 148.199MHz, expandable for MARS operation
- 32 full-function Memories with lithium battery backup
- 100 Watts, fully adjustable on all modes
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Keyboard Entry. ICOM introduces a unique feature to shortwave receivers...direct keyboard entry for simplified operation. Precise frequencies can be easily selected by pushing the digit keys in sequence of frequency. The frequency will be automatically entered without changing the main tuning control.

Superior Receiver Performance. Passband tuning, wide dynamic range (100dB), a deep IF notch filter, adjustable AGC (Automatic Gain Control) and a noise blanker provide easy-to-adjust clear reception even in the presence of strong interference or high noise levels. A preamplifier allows improved reception of weak signals.

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Options. FM, RC-11 wireless remote controller, synthesized voice frequency readout, IC-CK70 DC adapter for 12 volt operation, MB-12 mobile mounting bracket, two CW filters, FL32-500Hz and FL63-250Hz, and high-grade 455KHz crystal filter, FL44A.

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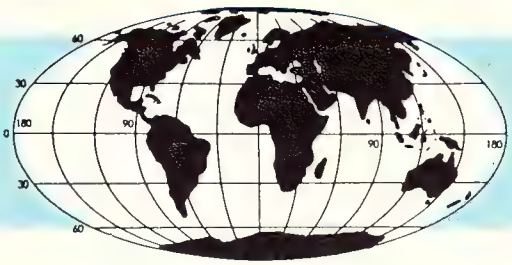

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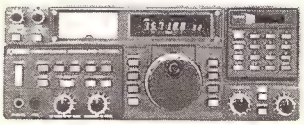

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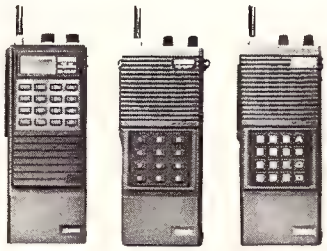

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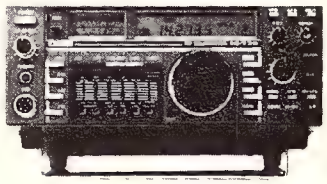

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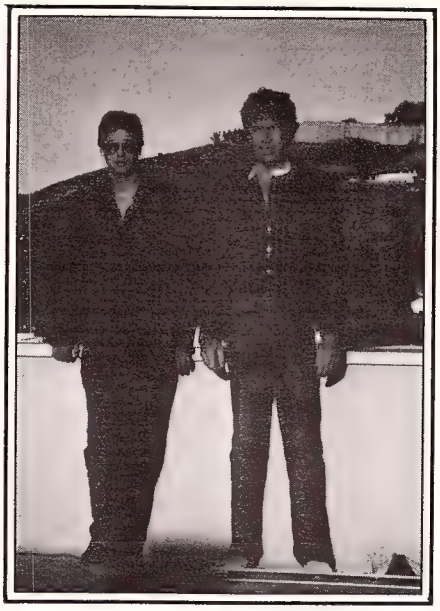
Ville, OH2MM, traveled halfway around the world to visit Phil, YB0ARA, and put his station to the test in the all-band category.

A fine single band 21 MHz effort was shown by KA2DIV/V2A.



Jim Neiger, N6TJ, is shown here next to host EA9KF just before the contest. Jim managed a fantastic 5 million plus to finish second to rival N6AA from 9Y4VT.

HB9AMO used this 85 foot vertical on 160 meters to amass 60K and a third-place finish. Lots of low-band activity at this time of the sunspot cycle.

1984 CQ WORLD-WIDE DX CONTEST C.W. RESULTS

BY LARRY BROCKMAN*, N6AR/4 AND BOB COX, K3EST,**

It is the 47th hour of the *CQ* WW CW test, and our hero is just about exhausted. It has been a long contest this year. The receiver has hissed continuously on 28 MHz, and George is sure there is something wrong with it. Where were all those Europeans on 10? Surely 10 meters was worth more than 20 QSOs. And 80 meters—if George hears W3 blankety blank call CQ one more time he will scream. Does K6 ump de ump really think he can fool us into believing those imaginary JA calls George heard him "logging" on 40? With George's 5 over 5, he would have heard them for sure. And then there's the litany of DX stations just running contact after contact who failed to identify their call. George tried his best on that one, transmitting a well-placed di di dah dah di di in there often to wake up those turkeys. The nerve of that UK2 for telling George he had duped him 7 times on 20. Right now, George was going to stop the daydreaming and get back to his CQing on 15. Got to get all those JAs he missed yesterday. This would be his best hour of the contest. But what's this? Oh, no. It's K6 ump de ump trying to take over George's frequency again. That guy would never learn; there he goes logging those imaginary calls, too. But George knows better, and another couple of cycles of the CQ machine and that K6 would be gone. Aw nuts, what's the use; George will move instead. So, up 5 kHz George goes and he strums out a CQ. "QRL, QRL . . ." resounds melodiously out of the receiver, so the dial spins again, and another CQ. "W3 blankety blank QRZ . . ."

Oh well, 40 is a better bet the last hour anyway. There are just 40 minutes left to go now, and George sets his mind to chasing multipliers. With a flash he is tuned up and ready to go. What's this? It's for real, SU1IM on 40 CW. Boy, will he show that W3. George is going to scoop him on zone 34 on 40. So, George sets after his prey. George calls him long, and George calls him hard. Well-placed 4 by 4's; that will do it. "Lid, lid . . ." booms from the headphones, but our hero is sure they're talking about that lousy W3 who is in there now, too. "K6 ump de ump, K6 ump de ump de SU1IM . . ." With this George has lost all vestige of the exhaustion we spoke of. George is now as single minded as a man can be. George is going to work that SU or else.

It is now 0005Z, and George is sure he will be next with the SU. Everyone has stopped calling, and it'll be clear on this next try. But the phone rings. It's Joe over at W3 blankety blank. "How was it? It was fantastic, the best CQ WW ever . . ." With that pearl, let us just check and find out how the Georges and Joes of the world did this year.

The All Band Results

This year's new team competition seems to have generated interest and rivalry among some of the perennial entrants. The "Downhill Contesting Team" sent representatives to 5 continents, and ended up with 4 of the top 7 single operator scores in the world. Dick Norton, returning again to 9Y4VU, took the top spot with 5.6 million, with teamate Jim Neiger a close second with 5.0M from EA9KF. Jim

*12041 Walker Pond Rd., Winter Garden, FL 32787
**c/o CQ magazine

managed an outstanding 160 meter effort on multipliers, but Dick made up for it with many more contacts (almost 200) and multipliers on 10 meters. Dave, N3RD/VP9, rounded out the top 3 with a fine 3.7 M. Marty Laine, OH2BH, posted a 4th place finish from CT1BCM, setting a new European Continental record, the only single operator all-band record set this year. In the USA category, Lew, N2LT, captured the lead with 2.2 M, and then WA8YVR at 1.9M and K1DG at 1.85 M. These were followed by 5 other W's within 200K of each other in a tough competition with many hours of poor conditions. The West Coast seemed to be particularly hard hit on conditions, with the best of the 6's and 7's managing to just break 1 M.

A contingent from Southern California traveled to French Guiana to join some of the locals for a super first-place effort in the world multi-single category (7.6M), a score that would have been second high in the World as a multi-multi. KD7P/KH2 provided much needed zone 27 activity in their 4.5 M second-place finish, a new Oceania record. EA3VY, 5H3BH, and HZ1AB in that order were in an incredible scramble for third, with only 100 K separating them out of 4 M. In the USA, it was Tom Taormina's new K5RC super station out of Texas that walked away with a 3.2 M first place, followed by K1ZZ and K1RX.

The boys at EA9CE radiated fine signals on all bands in their world high multi-multi effort with 9.2 M. Gene Walsh's N2AA multi-op machine took second honors from the USA with a fantastic 6.3M. Gene's 152 extra multipliers were no match for the extra 2800 W's and Europeans the EA9's logged. W3LPL and K6UA were second and third stateside, and fourth and sixth worldwide. YU1EXY, third worldwide, and JA9YBA, fifth worldwide, topped the multi-multi competition in Europe and Japan, respectively.

Single Band Results

This was a disastrous year for the high bands as old sol continued the decline in the cycle. Virtually no 10 meter activity existed other than the all banders. But, out of the noise some of the faithful managed to pull as many as 280 contacts and 43 countries. 4M7QP took the USA high with just 15 K, followed by DJ6RX and W8WPC. Stateside, W8WPC's 8550 was tops, with Jay Carr, W6FAY, second at 5814.

Fifteen meters was also down somewhat (see some of the comments in QRM). Yet 9Y4W amassed 700 K to win for the world, with fellow South Americans PY5ZR and LU4FDM behind him. K2EK finished fourth worldwide with 277 K, enough for the USA lead. He was followed stateside by W4UM and W6YA.

Jorge, LU8DQ, lost in his bid to set a world 14 MHz single-band record to add to his existing 15 and 10 meter world records, but he managed to pile up 1 M points on 20, the only single band score to exceed 1 M this year. OH8OS took second place with 715 K, and set a new European record on the way. N5CR racked up 337 K to take USA honors, with N3RS and KM9D, both over 300 K, in close competition.

It was the low bands where the slack was taken up, particularly on 40 meters. Four Continental records and the USA mark were wiped out. In fact, 4 USA stations broke KØRF's old 1981 mark of 337 K, with Dave, N5JJ, taking the marbles with a phenomenal 424 K. N6RO, K5MR, and K6NA used the excellent JA and

TOP SCORES

WORLD Single Operator All Band		USA Single Operator All Band	
9Y4VT	5,595,040	N2LT	2,192,028
EA9KF	5,014,224	WA8YVR	1,928,259
N3RD/VP9	3,668,256	K1DG	1,850,453
CT1BCM	3,295,152	K1OX	1,843,428
4V2C	3,205,896	W1KM	1,741,922
ZL3GQ	2,756,467	W4RX	1,663,305
YBØARA	2,663,424	K1EA	1,634,165
FM/W6SZN	2,581,176	N4WW	1,615,940
EA2IA	2,468,804	W1RM	1,556,100
N2LT	2,192,028	K3WW	1,450,345

Single Op Single Band 28 MHz		Single Op Single Band 28 MHz	
4M7QP	14,980	W8WPC	8,550
DJ6RX	11,020	W6FAY	5,814
W8WPC	8,550	W9VA	2,046
W6FAY	5,814	W1VEF	1,431
JH2KKW	5,354		
JO1NZT	4,448		

21 MHz		21 MHz	
9Y4W	701,181	K2EK	276,727
PY5ZR	403,627	W4UM	228,384
LU4FDM	362,664	W6YA	189,810
K2EK	276,727	W5VGX	176,596
UP2BM/UF	258,405	K5TSQ	171,336
IK2DVG	230,608	K3VK	122,109

14 MHz		14 MHz	
LU8DQ	1,027,860	N5CR	336,708
OH8OS	715,692	N3RS	314,505
YU4GD	539,760	KM9D	307,024
YT3A	421,031	N6GG	247,628
YV1TO	418,698	W6BH	247,324
YU7AV	388,088	N7TT	243,595

7 MHz		7 MHz	
YX5A	696,150	N5JJ	424,853
DK3GI	608,612	N6RO	376,301
UP3BA/UF	573,648	K5MR	365,613
9Y4VU	546,735	K6NA	343,035
YU3EY	545,936	K1BW	314,360
TE1C	519,480	WT4A	254,898

3.5 MHz		3.5 MHz	
UP2NK/UF	283,362	W1FV	99,495
UZ9AWZ	250,614	AA6AA	92,133
UH8EAA	210,820	N4RJ	69,258
HA8KQX	210,240	N7DF/Ø	51,354
EA8RL	207,823	W9LT	37,051
I4EAT	160,540	W5RK	35,840

1.8 MHz		1.8 MHz	
LZ1KDP	78,088	K5UR	28,032
LZ2CJ	60,844	K1ZM	19,323
HB9AMO	60,680	N2SU	9,604
4X4NJ	48,114	W1CF	7,917
YV3AGT	47,679	N9NB	7,728
YV1OB	45,584	K6SE	7,500

Multi-Operator Single Transmitter		Multi-Operator Single Transmitter	
FYØGA	7,617,235	K5RC	3,221,384
KD7P/KH2	4,487,665	K1ZZ	2,773,744
EA3VY	4,053,000	K1RX	2,492,475
5H3BH	4,036,290	N4AR	2,445,534
HZ1AB	3,913,525	W3BGN	2,349,839
OK5R	3,656,054	W8UA	2,147,508

Multi-Operator Multi-Transmitter		Multi-Operator Multi-Transmitter	
EA9CE	9,170,984	N2AA	6,315,520
N2AA	6,315,520	W3LPL	4,646,621
YU1EXY	5,529,092	K6UA	4,217,924
W3LPL	4,646,621	W3GM	3,500,928
JA9YBA	4,470,165	WØAIH/9	1,723,711
K6UA	4,217,924	N4ZC	1,198,449

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From: Everett L. Gracey

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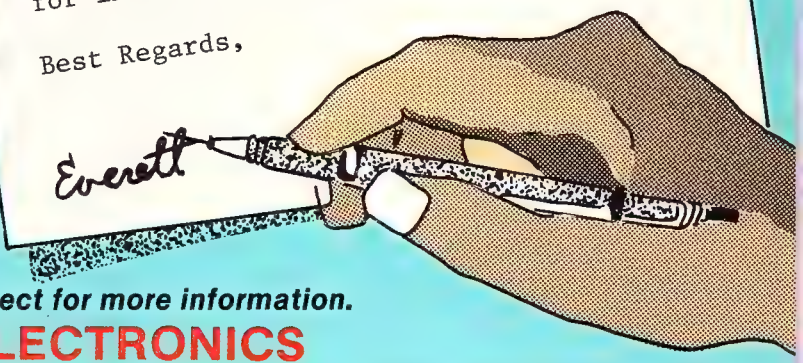

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And working the DX has never been easier with dual VFOs, single-button VFO/memory swap for split-frequency operation, eight memories, and push-button quick memory and band scan.

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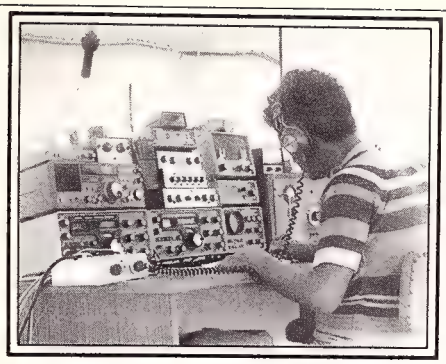

Another 160 meter super effort from Charles, YV1OB, in his tent operating location.

European openings that lasted all through the night to finish above the old mark in that order. YX5A topped the pack worldwide with 696 K, a new South American mark. DK3GI and UP3BA/UF were next, each setting a new Continental mark for Europe and Asia. Randy, KH6XX set the fourth continental record with a 427 K score from Oceania.

In his first try outside of the home QTH, UP2NK managed to top the field on 80 worldwide with a fine 283K score, a new Asian record. He was trailed by Sam, UA9AN, from UZ9AWZ with 250 K, and UH8EAA with 210 K for a Russian and Asian sweep of the top 3. HA8KQX finished fourth by less than a 600 point margin, but managed to capture the new European record on 80. W1FV topped the competition on 80 in the States, with just under 100 K. He was closely pursued by Steve, AA6AA, at 92 K. Your Director, a long-term West Coast operator, is speechless over the thought of 60 countries in one weekend on 80 from California. Unless you have operated from W6 land, you'll never ever know how tough that is. Congratulations, Steve.

The low-band activity was phenomenal on 160, with many scores over 30 K this year, a score that would have seemed virtually impossible just a few years ago for all except the anointed. LZ1KDP set a new European standard with 78 K on the low band, with fellow countryman LZ2CJ second at 60 K. The rest of the top four included HB9AMO, narrowly edged out for second, and 4X4NJ. YV3AGT topped YV1OB for fifth place. K5UR was way out in front in the USA with a USA record high of 28 K. K1ZM was second at 19 K.

Club and Team Contesting

The club competition was heated again this year, with Frankford Radio Club narrowly edging out arch rival Yankee Clipper Contest Club by 74 M compared to 71 M. The Southern California Contest Club was a distant third with 38 M. In the DX Club category, the Bavarian Contest Club put on a well-organized team effort, with most of the scores coming from the home front. Their 12 M put them on top, with the Kaunas Institute finishing second at 9M + . We would like to emphasize to all those interested in the club category that it is important that all logs from the clubs be clearly marked with the name of the club. Also, be sure your club sends a list of members and their claimed score. Inaccuracies in the club score total are most often caused by the absence of the right data.

As mentioned earlier, the team contest category seems to have encouraged some activity—particularly among the FOC crowd. However, the "Downhill Contesting Team," a team consisting of N6AA, N6TJ, N6XX, OH2BH, and OH2MM, just creamed everyone by sending off all 5 members to great spots on 5 different continents. As 9Y4VT, EA9KF, XE2MX, CT1BCM, and YBØARA, these guys bullied there way to 18 M points, far ahead of the crowd. The FOC submitted four entries, but only three of the teams qualified, with Team A (G3FXB, G3MXJ, G4BUE, OZ1LO, and ZL3GQ) taking second place with 7.1 M.

Disaster Strike

It was bound to happen sooner or later. Unfortunately, it happened this year. As a volunteer group, the *CQ* Contest Committee is spread out over the country, and this neces-

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Donor: W2AB Memorial

World QRPp
Robert D. Epstein, K8IA
Donor: Gene Walsh, N2AA

World—Most Contacts
9Y4VT (Opr. Richard J. Norton, N6AA)
Donor: KV4AA Memorial (14270 KHz Group)

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Lewis Tompkins, N2LT
Donor: Frankford Radio Club

Canada
Reginald Brearly, VE2AYU
Donor: Canadian DX Association

Europe
CT1BCM (Opr. Martin Laine, OH2BH)
Donor: Ed Bissell, W3AU

Africa
Chris Burger, ZS6BCR
Donor: Gordon S. Marshall, W6RR

Asia
VS6TA (Opr. Paul Newberry, N4PN)
Donor: Japan CQ Magazine

Japan
Toshio Takahashi, JA1BWA
Donor: Japan Crazy Contesters Club

Oceania
Peter W. Watson, ZL3GQ
Donor: Maui Amateur Radio Club

SINGLE OPERATOR, SINGLE BAND

World (14 MHz)
Jorge Bozzo, LU8DQ
Donor: W2JT Memorial (NJ DX Association)

World—3.5 MHz
A.K. Krigzde, UP2NK/UF
Donor: Fred Capossela, K6SSS

World—1.8 MHz
LZ1KDP (Opr. Gosho Vodenitcharov, LZ1ZF)
Donor: KP4ES Memorial (Chip Margelli, K7JA)

USA (7 MHz)
David Busick, N5JJ
Donor: Northern Illinois DX Association

Canada (7 MHz)
Yuri Blanarovich, XN3BMV
Donor: Canadian Amateur Radio Federation

Caribbean/Central America
TE1C (Opr. Carlos Fonseca, TI2CF)
Donor: DX Club of Puerto Rico

Australian—14 MHz
Ditmar Kiesewetter, VK2APK
Donor: Jay Carr, W6FAY

Japan—21 MHz
Kazunori Kuroki, JR6EZE
Donor: DX Family Foundation

MULTI-OPERATOR SINGLE TRANSMITTER

World
FYØGA (Oprs. N6DX, N6ZV, N6VI, FM7CD, FY7AN, FY7CM, FY7YE)
Donor: Anthony Susen, W3AOH

U.S.A.
K5RC (Oprs. K5RC, NA5R, K5GN, KN5H, W5VAH, WA5ZVE, N5EA, K5GA)
Donor: Doug Zwiebel, KR2Q

MULTI-OPERATOR MULTI-TRANSMITTER

World
EA9CE (Oprs. EA9GJ, EA9HE, EA9HY, EA9IE, EA9JL, EA9JV, EA9KF, EA9KN, EA9KQ, EA9LD, EA9LZ, EA9MO, EA9PB)
Donor: Hazzard Reeves, K2GL

U.S.A.
W3LPL (Oprs. W3LPL, AI3M, KC8C, KF3P, KT3Y, N2FB, W3FG, WD4AXM)
Donor: Jim Rafferty, N6RJ

Europe
YU1EXY (YU1EA, YU1EW, YU1FW, YU1MSK, YU1PKC, YU1PDF, YU1RL, YU1RS, YU1UU, YU3IW)
Donor: OH DX Ring

CONTEST EXPEDITIONS

World Single Operator
David Hawes, N3RD/VP9
Donor: Yankee Clipper Contest Club

World Multi-Operator
5H3BH (Oprs. SMØAJU, SMØDJZ)
Donor: Bill Schneider, K2TT

SPECIAL SINGLE OPERATOR COMBINED SSB/CW

World—All Band
Doug Grant, K1DG
Donor: John Knight, W6YY

World—Single Band
Franklin Brooker, 9Y4VU
Donor: Yuri Blanarovich, VE3BMV

CLUB

World—SSB/CW
Frankford Radio Club
Donor: CQ Magazine

SPECIAL CQ MAGAZINE PLAQUES

9Y4VT (Opr. Richard Norton, N6AA)
VE7WJ (Opr. John Kiesel, KE7V)
N2AA (Oprs. N2AA, K2BQ, K2GL, K2NG, K2SS, K2TT, K2TW, K2UR, K3EST, K5NA, KC2X, KR2Q, KU2M, W2RQ)

sitates that we ship the logs twice—once from *CQ* to the Director in charge, who opens and sorts them and tabulates the high-claimed scores; and second, to each of the log checkers by the 13 categories. One of the boxes of contest logs was lost by the carrier in transit from the Director to the log checker. Specifically, the box of W4, W5, and W6 logs never got to their destination. After months of effort to trace and locate the shipment, we concluded that all was lost. Fortunately, as all logs are received by the Directors, the call, category, and score are recorded. Thus, we were able to construct the results for the entrants whose logs were missing on the basis of their high-claimed scores. After giving up on the carrier, every effort was made to collect the complete line scores. We are indebted to the many stations who cooperated with us in our attempt to do this, and our apologies to those who didn't get the word. If your line score is not listed, please forgive us for the inconvenience.

For The Record

For several years now we have been harping on the duplicate issue. Nevertheless, we continue to see the problem. People who should know better still leave duplicates in their logs, and neglect to fill out and send in check sheets with their logs.

Perhaps they ask whether it is fair to disqualify an entrant who works hard all weekend during the contest just because he leaves "a few" duplicates in the log. Let us emphasize the other side. Is it fair to award someone who edges out a competitor by less than the point value of those duplicates? Those who lost in a tight one need assurance that their hard work and effort are rewarded and not someone else's sloppiness. The *CQ* WW Committee has a duty to preserve the integrity of the contest accordingly. Yet, each of our committee members is inundated with several hundred logs in each category. Time and workload preclude us from dupe-checking each log thoroughly. So, when we find a log that has a duplicate, our only recourse is to come down hard, and that's what we do. For the first 1%, the penalty is 3 QSO's for every duplicate. Up to 3%, the penalty is 10 QSOs for every duplicate. Above 3%, it's goodbye.

Station 4U1ITU was put on the air this year by K1CC, a welcome European multiplier.

It is amazing that anyone would spend the time planning, traveling, and operating in some of the remote locations and then refuse to spend a few hours checking the log afterward. That is part of the game, and if you don't play the whole game, you may not finish at all. Take the time to check your log. Even if you do it during the contest, check it again afterwards. If you hate it so much you just won't check it, then avail yourself of one of the computer checking services. In any event, if you're serious enough to want to compete and be considered for an award, then you must accept the responsibility for the checking and for meeting a submission deadline.

There's a rash of disqualifications this year. Some of them would have been super efforts even had they been checked, but, they weren't properly checked. What a shame.

Thanks Due

Our thanks to all who helped in the assembly and processing of this year's results. Our committee members include Frank, W1WY, John, K9DX/6; Terry, N6CW; Rick, N6ND; Dave, K2SS; John, K1AR; Ed, N3ED; Fred, AD6C; Jan, N6AW; Glenn, K6NA, Jim, W7EJ; Gene, N2AA; John, K2VV; and Doug, KR2Q. Their work and dedication are appreciated by us all.

Our thanks as well to all who participated in expeditions. Their activity gave all of us additional multipliers and fun. The calls we can thank are N6XX, N6AA, N6TJ, N3RD, WA3LRO, N4KR, N4PN, W6SZN, KD7P, JE1JKL, K1CC, K3UOC, K2KTT, UP2BM, UP3BA, UP2NK, OH2MM, OH2BH, OH2BAZ, VE3DAP, KA2DIV, FY0GA, GJ0AAA, VP2VCW, HZ1AB, 5H3BH, W8ZF, and others who put time, money, and sweat into making the contest special for all of us.

It's about time for George to appear again for the 1985 Contest. Good luck with that SU, George, and 73 to all.

Larry N6AR, and Bob K3EST

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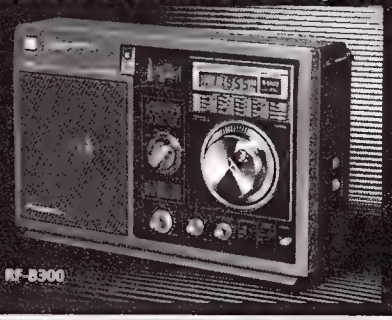

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CIRCLE 80 ON READER SERVICE CARD

BAND-BY-BAND BREAKDOWN—TOP ALL BAND SCORES

Number groups indicate: QSO's/Zones/Countries on each band.

WORLD TOP SINGLE OPERATOR—ALL BAND

Station	160	80	40	20	15	10
9Y4VT	133/8/16	533/20/57	981/23/62	1219/29/75	1186/24/71	233/20/35
EA9KF	155/9/43	539/14/55	825/19/68	1182/29/71	1096/24/72	38/14/20
N3RD/VP9	73/5/9	336/14/44	1064/21/61	1192/28/82	1188/24/76	44/6/6
CT1BCM	166/8/37	380/19/64	742/21/66	712/30/72	1043/27/72	65/18/33
4V2C	37/6/9	416/22/55	1000/30/68	1024/30/60	1192/24/57	44/5/6
ZL3GQ	19/10/10	160/22/41	420/21/47	554/27/62	1176/28/68	250/16/27
YB0ARA	5/3/4	183/21/31	455/27/62	845/33/73	851/25/66	34/16/23
FM/W6SZN	12/4/5	480/15/47	1192/20/61	293/19/49	944/21/55	203/8/8
EA2IA	5/2/5	588/16/54	710/20/75	998/28/76	736/26/75	4/3/4
N2LT	19/5/11	107/18/49	413/32/87	683/34/92	468/24/77	13/6/9

WORLD TOP MULTI-OPERATOR SINGLE TRANSMITTER

FY0GA	148/13/41	420/18/57	1425/27/84	1303/35/84	1695/25/78	127/13/24
KD7P/KH2	61/11/11	428/24/34	895/32/60	619/35/81	1097/32/72	275/25/38
EA3VY	90/11/52	332/16/66	1354/24/81	1076/29/81	926/27/77	24/12/24
5H3BH	3/2/3	29/12/18	394/26/57	1279/33/90	1477/28/85	104/16/45
HZ1AB	107/9/32	319/10/38	1053/30/82	697/29/71	685/29/84	136/17/44
OK5R	151/8/50	701/23/77	880/31/97	813/35/98	460/34/89	34/12/32

WORLD TOP MULTI-OPERATOR MULTI-TRANSMITTER

EA9CE	451/9/57	1065/16/61	1578/21/73	1679/32/78	1381/21/65	156/12/43
N2AA	140/17/48	295/23/77	1239/38/103	1126/37/122	591/28/89	97/14/24
YU1EXY	390/11/48	1020/23/73	1167/29/92	1424/35/104	600/33/98	100/15/35
W3LPL	57/11/28	223/21/70	932/36/108	748/36/109	704/27/100	60/17/26
JA9YBA	14/6/6	395/27/55	1117/33/88	1215/37/96	516/31/68	44/15/21
K6UA	134/11/16	396/24/48	923/34/93	900/37/104	508/28/68	126/17/28

USA TOP SINGLE OPERATOR—ALL BAND

Station	160	80	40	20	15	10
N2LT	19/5/11	107/18/49	413/32/87	683/34/92	468/24/77	13/6/9
WA8YVR	26/7/16	147/23/55	267/34/76	576/36/85	424/27/75	24/11/14
K1DG	24/9/15	137/20/54	372/31/81	424/31/83	444/23/74	28/13/17
K1OX	15/6/7	94/16/51	410/33/78	447/32/87	440/26/86	22/11/14
W1KM	20/8/14	227/19/64	258/29/71	390/33/83	406/26/74	17/9/12
W4RX	39/9/20	107/17/43	346/32/78	334/35/89	398/27/78	31/15/22
K1EA	7/4/4	118/17/45	305/30/70	597/28/79	372/24/76	22/12/14
N4WW	20/8/13	99/15/46	365/31/67	378/35/83	430/26/77	31/12/17
W1RM	3/3/3	126/2/59	179/30/80	400/31/91	416/27/78	21/12/14
K3WW	9/6/7	118/20/52	281/31/78	423/31/85	355/22/66	15/11/12

USA TOP MULTI-OPERATOR SINGLE TRANSMITTER

K5RC	24/13/22	178/26/60	853/35/99	443/35/108	448/30/80	52/21/33
K1ZZ	29/9/18	145/17/53	413/31/88	641/33/102	540/27/87	27/13/18
K1RX	9/5/5	103/22/61	491/35/99	759/35/98	377/26/82	21/14/19
N4AR	33/12/26	109/22/62	439/37/110	604/36/98	383/28/79	23/15/21
W3BGN	43/14/30	113/19/58	355/35/92	649/34/95	408/27/84	26/14/21
W8UA	23/8/21	117/21/52	375/34/83	635/34/94	337/27/86	27/13/20

USA TOP MULTI-OPERATOR MULTI-TRANSMITTER

N2AA	140/17/48	295/23/77	1239/38/123	1126/37/122	591/28/89	97/14/24
W3LPL	57/11/28	223/21/70	932/36/108	748/36/109	704/27/100	60/17/26
K6UA	134/11/16	396/24/48	923/34/93	900/37/104	508/28/68	126/17/28
W3GM	95/17/43	226/23/69	563/34/100	748/37/102	438/26/87	51/14/24
W0AIH/9	76/8/10	215/23/53	257/32/74	622/34/87	271/26/68	61/13/21
N4ZC	—	40/14/25	456/35/88	338/29/69	274/25/69	14/7/9

DX QRM

This was my 43rd *CQ* Contest, and I really enjoyed stayng on 40 for the first ime. Nothing comparable to the mid 60's . . . *UA9AN.* 160 meters—wow! . . . *FY0GA.* Lost a pair of 930s, but still put zone 27 in a lot of logs via the incredible long paths on all bands . . . *KD7P/KH2.* Antenna was apartment dweller's special at 320 ft. . . . *W3HHB/KH6.* With only 2 operators and 2 log keepers, a power failure, high power line noise and limited experience (our 2nd contest) we managed to survive the dogpiles and the weekend . . . *VI3WI.* The first *CQ* WW from a new location . . . *YZ2CRU.* This is our first multi-multi . . . *JG1ZUY.* Age 14—used no electronic or memory keyer, only "classical pump" . . . *OH2BSS.* Moved house just a few weeks prior to the contest; great to test performance of the new antenna in the premier operating event of the year . . . *OH2BN.* I am a schoolboy now in electronic middle school, age 19 . . . *SP4EEZ.* Missed at least 50 QSOs and a couple of multipliers on 160 because of my CW . . . *LZ2CJ.* To the NH6J—rough copy and I think maybe I didn't make it, huh? . . . *YU7AD.* My company gave me two days off to prepare for the contest. On Monday everybody asked me what place I won . . . *YU7AF.*

Next year with a better antenna . . . *OK1DMA.* Very strong wind (about 140 km/hr.) partly destroyed my antennas . . . *OK1AWC.* WAC on 160 in 19 hours, 43 minutes YV1OB, W1RR, EA9CE, 4X4NJ, HB9AMO, and VK6HD . . . *OK1DFF.* Super 40; poor 10 . . . *OK5R.* Much trouble with the antennas and electricity due to frost and a wind of over 160 km/hr! . . . *OK1KSO.* Our best score in this contest—many thanks for the contest . . . *OK3KII.* 40 and 80 were terrific . . . *OZ8JYL.* Our first time in the *CQ* WW and had a great time . . . *G4OTU.* Don't leave testing of new equipment and antennas until 4 hours before the contest . . . *OH2BR.* 22 years since my last contest . . . *OH2AI.* You'll never fall asleep if you drink the tea the chief operator gives you . . . *DL0IU.* A storm 2 days before the contest damaged our tribander, so little activity on the HF bands here . . . *GU3HFN.* N2AA was the loudest signal from North America on 80 and 40 all the time . . . *G3VBL.* Our 4th visit to the Channel Islands for the contest. The new club call helped to keep stations calling . . . *GJ0AAA.*

Enjoyed our 3 week trip to Malta with 18,000 QSOs CW only . . . *9H3DI.* Very fine contest, but bad conditions on 10 and 15 . . . *PA3CEF.* Too much trouble for 48 hours . . . *YZ4Z.* Excellent propagation, good activity . . . *HA8KQX.* Pileups on 40 were great . . . *C53J.* First all-band effort; will be back bigger and better next year . . . *ZS6BCR.* It would be nice to operate from the East Coast . . . *VE7BS.* No more Yagis. Couldn't get through to YB, DX1, etc. Back to loops in 1985 . . . *XN3BMV.* Several power failures didn't help the QSO count . . . *9M2RT.* Must be a long time since ZC4 was on in the contest judging by the ops who asked "4CZ?". Credit to the West Coast USA ops who got the call the first time . . . *ZC4CZ.* It was so hard to work Europe from this side of the World . . . *NH6J/NH8.* First serious effort for 8 years . . . *ZL3GQ.* 1.8 MHz from equatorial countries is hard . . . *P29PR.* After 25 years of *CQ* WW DX contesting, this was my first DXpedition . . . *UP2NK/UF.* FY0GA was very strong in Asia on 160 . . . *UA9CBO.* Thanks to *CQ* for this great contest . . . *UA9AB.* First time seriously from Europe as single op, modest station, and no conditions. Still, a record is a thrill!! . . . *CT1BCM (OH2BH).*

At whatever QTH I work the *CQ* WW, every year there is a storm that brings down the antenna (this year 40 M) . . . *DL8MBS.* The amplifier had to be turned off after 6 hours of operation because a neighbor's doorbell rang when I used it . . . *DK3GI.* Not good propagation on the upper bands, especially 28 MHz . . . *EA2IA.* Just wanted to look for DX stations, but got hooked . . . *EA5CF.* It is impossible for a little station to find a hole in the band for a call . . . *ED1CI.* After years of contesting on SSB, this was my first try at CW. All I can say is BEAUTIFUL . . . *EA6GP.* Very enjoyable contest, as always . . . *EI4DW.* East coast USA automatic keyers sure does raise the QRM level . . . *EI3DP.* Propagation fair, but no JAs . . . *EI1DH.* Despite the high winds on Saturday, my tower stayed up this year . . . *G4BUE.* 100 watts, 3 element Yagi, and 12 beers . . . *F6AUS.* The contest was great, but the logs are sure a lot of trouble . . . *G3VMW.* Most pleasant happening to find 15 open . . . *G3ESF.*

Very tiring on my first attempt ever . . . *G4UOL.* I realize I'll probably come in on the bottom with my entry, but who cares when I had so much fun . . . *G3URA.* California at 0957 on 40 (K6NA)! . . . *G4IUF.* Heard the first W break through Europe at 2332 on 3.5 MHz—finally worked him at 0153 . . . *GD5AVF.* Last time I won the GM certificate was in 1957 . . . *GM8SQ.* CW is a real pleasure for me; it's a kind of an art . . . *HB9CWA.* It was great fun working a pileup never possible from my home QTH at SP5EXA . . . *JW0EQ.* I like the everyone works everyone format . . . *LA0EH.* High speed Arctic flutter makes copy difficult . . . *LA9ZV.* TVI problems, a party, and a hangover . . . *LA9GY.* Highest multiplier I ever had . . . *OZ1LO.* Most expeditions only give their call signs every 5 minutes . . . *OZ8AE.* DX only heard during sun up/sun down passings . . . *OZ8CT.* Every year the biggest contest . . . *PA0TA.* Conditions poor on 160, but proud of my 58 countries . . . *PA3BFM.* Three more new ones added to QRPP DXCC . . . *OK1KDR.* Funny how little difference QRP or QRO really makes in a contest . . . *PA3BUD.*

USA QRM

Greatest fun is meeting old friends—the comaraderie of a group contesting together . . . *W3BGN.* I survived another one . . . *W4OO.* JA's on 40 at 0430—the stack must work . . . *K5RC.* Single op keeps you busy . . . *K3WW.* Finally a chance to work the contest from the East Coast . . . *N4WW (N6AR/4).* I sure miss 28 MHz . . . *K3LR.* Take two aspirin and call me when the sunspots are back . . . *K1AR.* Power went out at 1306Z Saturday when a drunk driver knocked down a pole—it hurt me more than it hurt him . . . *W1KM.* Of all of the Friday nights of the year, why did my thrust bearing freeze up on this one . . . *K1VR.* Worked country number 100 on 160 M . . . *W1WAI.* Using a C-64 computer for

logging. Keyboard locked up and wiped out all the QSO information between 0400 and 1900Z on November 25 . . . *W1OR.* Strangest QRM problem—K1GQ's German Shepherd had 8 pups . . . *K1DG.* And I thought conditions were poor last year . . . *W1HUE.* WAC called me in 6 minutes . . . *K2VV.* Too bad the following stations on 80 M, all Q 5, couldn't hear the 6's calling them—UH8EAA, UR1RWX, ZL2JU, ZL1KVV, UP2NK/UF, YU1EXY, LZ1KAA, SK6JA, LA4PCI . . . *AA6AA.* Listening to 6's working JA's on 160, and can't even work the 6's . . . *NA2Q.*

With only 5 watts, this was a very long contest . . . *AA2Z/1.* Weird conditions—worked many Europeans long path . . . *N3RS.* My first Russian Roulette Contest—the wind blowing my free-wheeling beam . . . *W1PL.* Ten often open, but no activity . . . *W7IR.* Biggest thrill is pulling weak DX through loud W's calling CQ . . . *W7FGT.* Almost no Europeans heard on 21 MHz in Pacific Northwest . . . *KE7C.* If conditions get any worse, next year's log will fit on a postcard . . . *KU7M.* Or, it may come from Dr. DX . . . *KO7G.* In 1981 worked 162 USSR stations; in 1984 worked 23 of them . . . *K7ZA.* Can't wait till 1989 . . . *K8NZ.* Had several brief openings on 10 M to snag the countries I needed . . . *W8WPC.* Forty was really alive . . . *W8UVZ.* It was fun sharing the rig with my son, KA9QYA; his first contest . . . *K9BQL.* Wish more DX stations would work split on 80 . . . *W9RN.* Let's swap CW and SSB weekends every other year so the CW gang gets a shot at the usually better October propagation . . . *WØWP.* How about a low band category? . . . *ABØX (ed.—the ARRL tried it).* Like the new log forms . . . *WØJU.*

Station Operators

Multi-Operator, Single Transmitter

AG7M & KW7Q. **AK1L** & KA1FBY, KA1X, KC1X. **DFØAFZ:** DL3ZI, DL2ZAE, DK1DO, DJØGN, DL4FBZ, DL5FQ. **DFØBV:** DJ1OJ, DL/LX1II, DL7MAE. **DL1MAJ** & DL5MAE, DK2OY, DL4MAH, DL5MBO. **DL3HAH:** DF4XG, DL1HBT, DL2HAA, DL2HCB, DL3HAH, DL3HBS. **DLØER:** DK7FP, DJ2LA, DJ5GN, DF5EN, DL6EAD, DL5EBN, DL9XY. **DLØIU:** DK7AH, DK8AG, DL4AAA, DL4AAE. **DLØLR:** DJ7PT, DL8RE, DJ2GW, DJ3ZX, DF4WV, DF4WY, DF4PA, DF4PB, DF4PM. **DLØWN:** DA1PG, DJ1MU, DJ2RH, DJ9CB, DJØLC, DF5ZP, DK6ZG, DK8FK, DL1AO. **DX1A:** DU1RU, DU1TW, DJ1US/DU. **EA3VY** & EA3LL, EA3KU, EA3AIR, EA3AVV, EA3DXD, EA3EEE, EA3FER. **EA6URP:** EA6DO, EA6DI, EA6EJ, EA6FG. **ED7BB:** EA7TH, EA7CFW, EA7BU, EA7FFA, EA7EL, EA7CEC. **F3TV:** F6ARC, F6BEE. F9IE. **F6ENV** & F6DUR, F6BGY. **F6FYA** & F6KEQ, F6ERS. **F6IGF** & F5UB. **F6IWW** & F6BYJ, F6AWN. **FYØGA:** FM7CD, FY7AN, FY7CM, FY7YE, N6DX, N6VI, N6ZV. **G4OTU** & G4XFB. **GJØAAA:** G3SXW, G3TXF, G3WVG. **GU3HFN:** GU3MBS, GU4WRP.

HA1KRR: Sandor, Jozsef, Zsolt, Janos, Jozsef, Janos. **HA2KMR:** Jozsef, Atilla, Gabor, Csaba, Janos, Lazslo. **HA3KNA:** HA3FTA, HA3OV, HA3OU, HA3NS, HA3NU. **HA5KDY:** Miklos, Artur, Bela. **HA6KNX:** JOzsef, Gyula, Zsolt, Nandor. **HA7KMP:** Tamas, Janos, Alexandros. **HA8KCK:** HA8EK, HA8DZ, HA8DT, HA8ES, Marko, Attila. **HA8KVK:** Laszlo, Jozsef, Lazslo. **HA8KWG:** Kezelo, Sav, Ado. **HB9AJ:** HB9AOF, HB9COC, HB9COF, HB9BWN, HB9CRP, HB9CJR, HB9CBT, HB9OL, HB9BEL, HB9CTU, HB9CIO, HB9CJJ, HB9CYK, HB9CCT, HB9UH. **HB9BXQ** & HB9AKW, HB9BRJ, HB9BUN, HB9CKM. **HG1S:** Fyula, Otto, Lazslo, Tibor, Lazslo, Istuan. **HG5A:** Peter, Laszlo, Tamas, Peter, Sendir, Manozsan **HG6N:** HA6ND, HA6NY, HA6ON, HA6NQ, HA6DQ, HA6NF. **HG6V:** Lazslo, Geza, Sandor, Peter, Jozsef, Zoltan. **HG7B:** HA7UX, HA5WA, HA7UG, HA7UO, HA7SH, HA7UL. **HG9R:** HA9PP, HA9PV, HA9RB, HA9RP, HA9RU, HA9RX. **HZ1AB:** G4WZI, K2XR, W7KJJ, W7SE, WA8MOA.

JA1YAD: JO1HJK, JR6JOE, JH7UCC, JH9ADA. **JH1YDT:** JH6UUN, JHØHNI, JP1AIE, JH4UTP, JK1UPX, JO1HSX. **JA1YNE:** JA1VNA, JA6QJG/1, JE3PTA/1, JH4VBQ/1, JH3QYD/1, JA4WWO/1, JA7IHR/1. **JA1YXP:** JL1ROT, JM1AQU, JF2PPA, JJ1OHZ, JI2DLF. **JA1ZKL:** JI1RXR, JI1QBI, JK1JHU, JK1KIK, JL1DCA, JP1CZE, JM1WZP, JJ1VFE. **JA2YKA:** JJ1BTA, JJ1BTC, JH2QXG, JR2GMC, JE2JCV, JE2TEM, JE2VYM, JF2DQJ, JF2LTH, JG2MTC, JG2VTD, JI2JXR, JI2NPL, JG3OET, JL3LDL, JA9SSY, JA9XXS. **JA5YAV:** JA5MVU, JR6JZF, JH5PHC. **JA7YAB:** JJ1NNJ, JR7CDI, JR7VMF, JAØ-3440. **JA7YFB:** JJ1GXY, JN1RON, JR7GYC, JR7JLU, JR7LCI, JR7OEF, JR7QYW, JR7RLB, JE7MOY, JH7XMO, JH7XKI, JHØQNT. **JA7YFH:** JH7SFR, JE7HXC, JR7UOL, JR7ECK, JE7HMC, JR7MRQ, JO1HBF, JE7WQH, JE7JWU, JE7RCC, JE7XTQ, JR7MPT, JG2XUR. **JA7YRR:** JA7CLN, JA7JUD, JA7MQQ, JA7OZW, JA7LBY, JH7VHZ, JR7LVA. **JA8YAU:** JR7COO, JH8DXI, JH8MQZ, JH8NFQ. **JA8YBY:** JG1RVN, JE3XWH, JG3DVR, JR3MGM, JH5OHJ, JR8DQB, JH8KJW. **JA3ZRT/JD1:** JE3MAS, JH4PAM, JL3TLC. **K1RX** & KQ2M, K1RU, KF1V.

K1XM & K1PR, KQ1F, N1RC. **K1ZZ** & K1TO. **K3KG** & K4BAI, K4FJ, N4KUJ, N4TX, W4NL. **K5LZO** & K2TNO, K5TU, KA5SBS, KE5IV, NM5M, WB5RUS. **K5RC** & K5GA, K5GN, KN5H, N5EA, NA5R, W5VAH, WA5ZUE. **K5RR** & K5KJ, NR5K. **K5RX** & N5RZ. **K6TQ** & WA6TBO. **K6ZM** & AK6T, NB6L. **KØRWL** & KØFPC, KØSCM, KØUAA, KØVBU, KMØL, NØCIS, WØFI. **KB3MM** & N3ARK, WB3FIZ, WB3LFQ. **KC5DX** & NN5E. **KD7P/KH2** & KG6DX, KJ9W. **KH6SP:** AH6FS, WB3HVS. **W3HHG/KH6** & KH6DD. **KM1C** & KB1T, W1PH, W2IQD, WB8BTH. **KQ2O** & K2BK. **KR1R** & KS1N. **LX9BV:** LX1WW, LX1JP. **LZ1KAA:** LZ1JW, Stoyanov, Ivanov. **LZ1KAP:** Glushkov, Tedfilov, Ganchev. **LZ1KBL:** Keremidtchiev, Miladinov, Mimov. **LZ1KKI:** Vasilev, Rabadjiski. **LZ1KMC:** Kostov, Iliev, Ivanov. **LZ1KRB:** Kirov, Grudov, Nedialkov. **LZ1KRC:** Kostakiev, Pavlov. **LZ1KTM:** Hristow, Kirilow, Iwanow. **LZ2KCS:** Svetla, Toma. **LZ2KKK:** Kalajdziev, Georgiev, Diamandiev. **LZ2KTS:** LZ2HE, LZ2PO, LZ2CC, LZ2DF, LZ2UA, LZ2LZ, LZ2E41, LZ1A3102. **N2RM** & WA2HGM, KB3TN. **N4AR** & K8CC, W8KIC, K4FU, N4TY. **N4KG** & KC4ZV, WZ4F. **N6IC** & KA6SKW, N6DZG, NY6Y, Sharon. **N6VR** & WA6FGV, NS6X, AC6T, N6MA, N6ADI, AC6I. **N9WA** & KA9SLM, WD9GYX. **NDØE** & KDØPZ, WØKEA, WØRSG.

OE3GBB & OE3GEA. **OH1AA:** OH1CO, OH1DL, OH1JD, OH1JL, OH1WR. **OH2AI:** OH2BBF, OH2BJM. **OH2AQ:** OH2BCI, OH2BUQ, OH2BQW, OH2LQ. **OH2BR** & OH2BAD. **OH2VY** & OH2JA, OH2BEJ, OH2BEN, OH2BHP, OH2BQS, OH2BVI. **OH5NQ** & OH5NG, OH5KS, OH5LF, OH5TQ, OH5OZ, OH5UE, OH5UX, OH5XT. **OH7AB:** OH7UE, OH7RS, OH7JR, OH7XI, OH7TF. **OK1KIX:** OK1AID, OK1MEY, OK1MWI. **OK2KQO:** OK2BVI, OK2PAA, OK2MMW, OK2DIV. **OK3KII:** OK3CEI, OK3CAW, OK3CTL, ex-OL8CNI. **OK3KSQ:** OK3-27790, Alena. **OK3KTD:** OK3CES, OK3TEV, OK3TCF. **OK3RJB:** OK3TCL, OK3CQD, OK3CQR, OK3CSB, OK3TCN, OK3-26994. **OK5R:** OK1ADM, OK1ADS, OK1ALW, OK1DIM, OK1DWA. **ON6BR:** ON4ASE, ON4ASV, ON4AYL, ON5IA, ON5IG, ON5VA, ON6YN, ON7XN. **OZ5EDR:** OZ1HET, OZ3GN, OZ4UN. **OZ7DEN:** OZ1DKE, OZ1DYI, OZ7LZ. **OZ8JYL:** OZ1KHZ, OZ1IMH, OZ1GMG, OZ1JXH, OZ1FTW, OZ4DX, OZ1DGG, OZ1KUM, OZ5XY. **PA3ADJ:** PAØKHS, PAØNZH, PA3DGM, PA3DQW. **PA3CEF** & PA3CEE, PA3CGN. **PI4DEC:** PA3AWW, PA3BXD, PA3CJF, PA3CQU, PA3DJL, PAØLEG.

RB4IXW: Syrovatsky, Ovtcharov, Timonin. **RIØBWF:** Vlad, Rinat, Pavel. **RL8PYL:** RA3AA, UL7PAE, UL7PAO, UL7PAZ, UL7PBE, UL7PBY, UL7-023-434. **SK2AU:** SM2BJE, SM2DQS, SM2JUR. **SK5AA:** SM5FUG, SM5ACQ. **SK5EU:** SM5GLC, SM5AQD, SM5ODQ, SM5LZM. **SK6JA:** SM6AOU, SM6DER, SM6DOI, SM6SQO, SM6FYJ. **SK6RR:** SM6CVT, SM6LRR, SM6LGW. **SK7PI:** SM70XQ, SM7KNW, SM7KNM. **SP2ZFJ:** SP2FAP, SP2ASJ **SP6PAZ:** SP6FJG, SP6CYX, SP6IGE. **SP9ZHR/9:** SP9EMI, SP9CTS, SP9NLI. **UB4EWE:** UB5ES, Oleg, Eddy. **UB4IWB:** RB5IHR, RB5IHW, UB5IER. **UB4IWR:** Timuz, Nick, Ivan. **UB4IXB:** RB5II, UB5IFZ, UB5IML, UB5IOK, UB5IRM. **UB4LZA:** UB5LEE, UB5LHZ, UB5LSL, UY5DV, UB5-077-1347. **UB4MWA:** UB5MDA, UB5MDD,UB5MMR, UB5MOJ. **UB4MWU:** UB5MWM, UB5MJS, UB5MWU, Nick, Igor. **UB4SWM:** Vasil, Vasil, Slava. **UB4VWA:** Ovcharenko, Guktovoj. **UB4XWB:** UT5QG, Viktor T, Viktor Y. **UC1AWC:** Leonid, Alexandir, Sergej. **UC1AWF:** Yuri, Sergei L. Sergei I. **UC1OWG:** UC2OA, UC2OEL, UC2RG. **UC1WWF:** UC2WBI, Nick, Alex. **UC1WWX:** Anatol, Oksoma, Wolsilij.

UL8BWW: UL7BAY, UL7BBB, UL7BCW. **UM9MWO:** UM8MFJ, Kim. **UO4OWR:** Slawa, Oleg, Alexey. **UP1BWG:** UP2BAA, UP2BLE, UP2BZ, UP2DT, UP2DZ, UP2-038-1191. **UP1BWV:** UP2BHM, UP2MC. **UP1BWW:** UP2BAS, UP2BBM, UP2BIJ, UP2MB, UP2PAX. **UP1BXF:** UP2BAI, UP2BON. **UP1BZA:** UP2BIC, UP2BKH, UP2OX. **UP1BZG:** UP2BCO, UP2BCT, UP2BCW, UP2BOC, UP2OA, Grazvydas. **UP2BZO:** UP2BFN, UP2BJQ, UP2BMX, UP2BNC, UP2BOA, UP2OO, UP3BB. **UP1BZR:** UP2BDW, UP2BJK, UP2BOQ, Dailyda, Matulaitis. **UP1BZZ:** UP2BAW, UP2BIE, UP2BIL, UP2PAJ. **UQ1GWW:** RQ2GG, UQ2GDW, UQ2OC, UQ2OI, UQ2-037-116, -83. **UQ1GWY:** RC2ICC, UQ2GMA. **UQ1GXF:** UQ2GFU, Dheyev. **UQ1GXW:** Ziedonis, Mikhail, Vladimir. **UR1RWN:** UR2RKM, UR2TAX, UA3-123-325. **UR1RWQ:** UR2-083-1013, UR2RNV. **UR1RWX:** UR2RDU, UR2RHF, UR2RNA, UR2RNX, UR2RNJ, UR2RRO, UR2-083-167. **UZ1AWJ:** Vladimir, Eugeney O, Eugeny Z, Iyla. **UZ1AWO:** Vladimir, Andrei, Alex. **UZ1CXA:** RA1AX, UA1AGZ, UW1CX. **UZ1TWB:** RA1TA, UA1TCW, UA1UM. **UZ1ZWI:** UA1ZBQ, UA1ZN, UA1ZO, UA1ZV. **UZ2FWA:** UA2FF, UA2FJ, UA2FM, UA2FX, UA2FZ, RA2FA. **UZ2FWZ:** Valery, Victor, Serge.

UZ3AXX: RA3DUY, UA3AQV, UA3DHW, Ave, Anov, Kav, Oleg. **UZ3AZW:** Plugin, Kholodkov, Khanin. **UZ3DXF:** UA3SCN, UV3DN. **UZ3DXW:** Onischuk, Chervyakow, Vershinin. **UZ3QXU:** UA3QAY, UV3QAK, UA3-121-3176. **UZ3WWW:** RA3WA, RA3WBY, RA3WCG, UA3WZ, UV3WT. **UZ3XWM:** UA3XEX, Ali, Serge. **UZ4AWB:** UA4ABZ, UA4AMT, UA4AMX. **UZ4AXQ:** Valery, Nick, Alex. **UZ4FWN:** UA4FFG, UA4FFH. **UZ4WWB:** Vlad, Andrei, Nick, Alex. **UZ4WWC:** Shustov, Varmalaov, Sabrekov, Plastinin, Nikiforov, Pavlov. **UZ6AZR:** UA6ABS, UA6BPU, Denis. **UZ6LXM:** UA6LFQ, UW6OE, Yuri. **UZ9AYA:** UA9ANF, Zaev. **UZ9AYE:** UA9AMA, UA9AOQ, Chernicov. **UZ9CWW:** UA9CDC, Varganov. **UZ9FWR:** RA9FN, UA4WA, UA9FAL, UA9FAR, UA9FGJ. **UZ9HWA:** UA9HEA, UA9HEC, UA9HQ. **UZ9SWY:** UA9SGW, UA9SGT, UA9SHO, UA9SIZ, UA9TS. **UZ9SXT:** UA9SAC, UA9SAR, UA9SCG, UV9SN. **UZ9UWK:** RZ9UZN, UZ9UEA, UA9ULB. **UZ9XWZ:** UA9XDG, UA9XDM, Eugeny. **UZ9XWW:** UA9XBD, UA9XHY, UA9XM, Budanov. **UZ0AWB:** Cuytez, Kovalenko, Kochkin. **UZ0CWA:** UA0CB, UA0CEM, UW0CA, UW0CM, Gorelic, Svytkovsky. **UZ0FWA:** UA0FCA, UA0FM, UA0FFH, UA0FFM, UW0FM. **UZ0QWA:** UA0QAS, UA0QBB, UA0QDC, UA0QDL. **UZ0QWE:** UA0QAA, UA0QJ, Alex.

V9ADC: WA2HZR, ZS6ME. **VE2CP** & VE2BHC, VE2BLX, VE2FKZ. **VE3SOO:** VE3ADP, VE3CRD, VE3EOW, VE3GF, VE3KOY. **VI3WI:** VK2EFJ, VK3BPW, VK3CWB, VK3DWN, VK2KFQ. **VO2WL:** K3TM, VO2AH. **W2OW** & KB2KW, KI2P, N2HR, NE2W, N6IN. **W2UI** & N3KR. **W2XL** & NA2N. **W3BGN** & N2BA, WA2ZKY, N3RG. **W3NZ** & KD3H. **W3YFV** & K3PPI. **W6BJH** & net. **WA4JXI** & WA4SVO. **WA4QQV** & WA4QMQ. **WB6ZHT** & K6HMA, N6HCS. **W8GWC** & N8DCJ, W8CZN, W8JGU, WA8DXB, W8RCN. **W0NA** & W0AR, W0CY, WA0TKJ. **WA4JXI** & WA4SVO. **WA4QQV** & WA4QMQ. **WB6ZHT** & K6HMA, N6HCS. **Y31ZL:** Y31SL, Y31RL, Y25CL. **Y35L:** Ÿ23DL, Y26IL, Y33VL, Y26BL. **Y43ZD:** Y43WD, Y25ID, Y57SD. **Y44ZO:** Y44NO, Y44JO. **Y67ZG:** Y21DG, Y25MG, Y67YG. **YO4KAY:** YO4SX, YO4DCY. **YO5KAY:** YO5BBO, YO5AFD, YO5BAT. **YO6KNY:** YO6ADW,YO6DBA. **YT3T:** YU3BQ, YU2CBV, YU3EIJ, Bob, Rob. **YT5A:** YU5RU, YU5TU, YU5XNM, YU5XMA, YU5RA, YU5DX. **YU1EFG:** YU1HA, YU1DR, YU1PZM. **YU2CKL:** Antic, YU2JL, YU2RR, Senecic. **YU4EZC:** Mustafa, Nedim, Suad. **YZ2CRT:** YZ2OG, YZ2RDQ, YU2MM, Tom. **YZ4Z:** YU4WFT, YU4WIA, YU4ECI, YU4WNW, YU4WRW, Ljube, YU4WQR, YU4WIM, YU1FJK, YU4WAW, YU4WTF, YU4WFT, Mario. **4N2D:** YU2RO, YU2WM, YU2FK, YU2LHR, Darko. **4U1VIC:** K7AWD, OE1NJB, OE1ETA, NK4N, OE1JJB, OE1WOW, OE3KAB, OE1GLA, OE3OLW. **5H3BH:** SM0AJU, SM0DJZ. **9H3DI:** DF8ZH, DL1RK, DL1ZQ, DF4ZL.

Station Operators
Multi-Operator, Multi-Transmitter

AA4S & AE4Y, NE4G, WQ4V. **DL0KF:** DF3LZ, DF6LH, DF8LZ, DJ2BV, DJ2LY, DJ3UL, DJ4FZ, DJ4SO, DJ5AZ, DJ6TK, DJ7SW, DJ8FR, DJ8HB, DL8LD, DK8LE, DK9WV, DL2ZT, DL3LAN, DL3LAR, DL5LC, DL8FY, DL9LBS. **EA9CE:** EA5BRA, EA7ALG, EA7DS, EA7TL, EA9EO, EA9EU, EA9GK, EA9GT, EA9HG, EA9JG, EA9KD. **KH6JS** & AH6FU. **JA2YEF:** JA9XDR, JE2KEA, JE2UGT, JF2ERH, JF2NFC, JF2QHC, JF2SFF, JF2VRV, JG2MPX, JG2PAJ, JI2LPD, JI2QVF, JR2PVJ, JR2TPD. **JA3YBF:** JA9TOZ, JA9UIZ, JA9UXW, JE6BXJ, JF3GYI, JF3KKO, JF3PGA, JG3LZG, JH9GRM, JI3KWZ, JI3XBE, JJ3PYI, JR4AGT, JR4IZK, Huruya, Doue, Yamada. **JA3YKC:** JA2VUP, JA3ODC, JE6LPM, JE3PMM, JF3RAL, JG3HJG, JG3HLV, JG3LLB, JH4RHF, JH5EML, JH5EZP, JI3ERV, JI3XTZ, JJ3SRU, JK3GRR, JK3HYA, JR4BSM, JR4IMK, JR4PMX, JR6NWN. **JA7YAA:** JE7HLZ, JE7QCQ, JG3GRM, JH7CUO, JH7HWR, JH0MRP, JJ1MVV, JJ1PEU, JR7PGL, JR7XBN. **JA7YCQ:** JE7HYJ, JN1RPG, JR7MZC, H Ikeda.

JA9YBA: JA9BEX, JA9LJI, JA9LNJ, JA9NFO, JA9OTX, JA9PPC, JA9QCE, JA9QWJ, JA9THK, JA9UAD, JA9VBW, JH7UJR, JH9OYH, JH0CAZ, JH0VUG, JI3SEB. **JG1ZUY:** JE1CKA, JF2IWL, JG1IMM, JH7PKU, JI1QQI, JI2GUT, JM1CAX, JM1RFT, JO1NAH, JR4NIV. **JW5E:** JW5NM, JW6VDA,JW6WDA. **K3ZUF** & KJ7K. **K6UA** & K6RF, K6VI, K0RF, KA6SAR, N6AW, N6ND, NI6W, W6KUT, W6UQF, WA6EJL. **KF3R** & N7BJT, WB2OYC. WB2YOF. **N2AA** & K2BQ, K2GL, K2NG, K2SS, K2TT, K2TW, K2UR, K3EST, K5NA, KC2X, KR2Q, KU2M, W2RQ. **NL7G** & KL7PJ, KL7Y, NL7P, WL7E. **OY6FRA:** OY2H, OY2J, OY3H, OY5NS. **W1BK** & AI3E, KC1Q, KV1Y, N1CW. **W3LPL** & AI3M, KC8C, KF3P, KT3Y, N2FB, W3FG, WD4AXM. **W9AIH/0** & W8KR, KN0V, W0UC, K0FVF, WA0RPW, KB9S. **XN3BVD:** VE3BVD, VE3DUS, VE3IY, VE3KZ, VE6OU. **YR6A:** YO3APJ, YO6AKN, YO6AW, YO6AZM, YO6DIK, YO6EZ, YO6HQ, YO6MZ,YO6VZ, YO6ZI. **YU1EXY:** YU1EA, YU1EW, YU1FW, YU1MSK, YU1PKC, YU1PSF, YU1RL, YU1RS, YU1UU, YU3IW. **YZ2CRU:** YU2CU, YU2PA, YU2RA.

SINGLE OP ZONE WINNERS

Zone	Call	Score			
1	KL7RA	783,863	21	RF6FR	823,004
2	No Entrant		22	No Entrant	
3	VE7WJ	1,389,025	23	No Entrant	
4	WA8YVR	1,928,259	24	VS6TA	1,809,310
5	N3RD/VP9	3,668,256	25	JA1BWA	1,099,280
6	XE2MX	1,465,671	26	No Entrant	
7	HP1XKR	640,226	27	JD1AMA	2,392
8	4V2C	3,205,896	28	YB0ARA	2,663,424
9	9Y4VT	5,595,040	29	VK8XX	3,026
10	No Entrant		30	VK2BQQ	490,175
11	PY4OD	680,400	31	KH6ND	1,851,525
12	CE2BFR	47,740	32	ZL3GQ	2,756,467
13	LU8DQ	1,027,860	33	EA9KF	5,014,224
14	CT1BCM	3,295,152	34	No Entrant	
15	OK3CGP	1,957,666	35	C53J	812,352
16	UB5EC	1,271,400	36	No Entrant	
17	UM8MBA	755,326	37	J28EG	8,398
18	UA9ND	263,648	38	ZS6BCR	1,624,576
19	UA0LCZ	469,238	39	3B8DB	155,176
20	LZ1CW	357,294	40	JW0EQ	548,270

U.S.A. Club Scores

Frankford Radio Club	74,416,677
Yankee Clipper Contest Club	70,327,911
Southern California Contest Club	38,858,559
Potomac Valley Radio Club	26,558,671
Dixie DXers	20,762,995
Northern California Contest Club	15,771,430
Mad River Contest Club	14,846,906
Texas DX Society	12,202,977
Northern California DX Club	10,736,543
North Texas Contest Club	10,446,005
Colorado Contest Conspiracy	6,903,362
Southern California DX Club	6,703,452
Carolina DX Association	6,430,272
Murphy's Marauders	6,362,716
San Diego DX Club	5,538,772
Southeastern DX Club	5,284,358
Grand Mesa Contesters	4,322,428
Kansas City DX Club	3,784,980
Rubber Circle Contest Club	3,656,431
Greater Milwaukee DX Association	3,407,138
South Florida DX Association	3,314,207
North Florida DX Association	3,266,203
Willamette Valley DX Club	2,956,918
Fraser Valley DX Club	2,710,134
Northern Ohio DX Association	2,645,138
Eastern Iowa DX Association	1,935,618
Central Indiana Contesters	1,609,854
Northern Illinois DX Association	1,583,580
Central Arizona DX Association	1,493,869
Mississippi Valley DX and Contest Club	1,332,628
Michigan DX Association	1,199,784
Southern New England DX Association	1,154,731
Four Lakes Amateur Radio Club	895,773
South Jersey Radio Association	732,448
Rochester DX Association	729,320
Wernersville Area Contest Organization	683,632
Long Island DX Association	555,936
Western Washington DX Club	510,001
Alamo DX Amigos	332,357
Metro DX Club	328,411
Ashtabula County Amateur Radio Club	273,616
Fox River Radio Club	168,783
Utica Amateur Radio Club	123,015
Boiled Owls of New York	118,665
Western Piedmont Amateur Radio Club	68,158

DX Club Scores

Bavarian Contest Club	12,978,952
Marianas Amateur Radio Club	9,905,333
Kaunas Polytechnik Institute	9,030,258
Pretoria Contest Club	7,598,516
Lithuanian Contest Club	6,918,497
Rein Ruhr DX Association	5,308,038
Down Under Contest Club	5,254,970
The Bullmertz	4,325,587
Alaska DX Association	4,151,263
Voroshilovgrad Radio Club	2,653,535
South German DX Group	2,517,042
YU DX Club	2,505,255
Tallinn Radio Club	2,479,689
Donetsk Radio Club	2,411,098
Chelyabinsk Radio Club	2,359,102
Ontario DX Club	1,303,595
Northern Lithuanian DX Group	1,139,037
SP DX Club	481,850
DX Club of Saar Pfalz	417,893
Kukuryukai Contest Club	284,744

WORLD TOP 10 QRPp
(5w input)
All Band

1.	K8IA	271,656
2.	4X6IF	258,132
3.	AA2Z/1	192,864
4.	K3WS	171,380
5.	UP2BL	161,109
6.	UB5IJA	119,024
7.	KA2AEV	108,224
8.	W8VSK	103,488
9.	YU3MJ	101,244
10.	K7SS	98,735

Team Contesting

1. Downhill Contest Team (9Y4VT by N6AA, EA9KF by N6TJ, CT1BCM by OH2BH, YBØARA by OH2MM, and XE2MX by N6ZZ) 18,033,611
2. FOC Team A (G3FXB, G3MXJ, G4BUE, OZ1LO, ZL3GQ) 7,165,812
3. FOC Team D (G3PDL, G3VMW, G3WPF, G4UPS, W1AX) 3,751,085
4. FOC Team B (G3KDB, G3LNS, G4CP, HH2VP) 3,420,847

Number groups after call letters denote following: Band (A=all), Final Score, Number of QSOs, Zones, and Countries. Certificate winners are listed in Bold Face.

SINGLE OPERATOR
NORTH AMERICA

UNITED STATES

K1DG	**A**	**1,850,453**	**1429**	**127**	**324**	
K1OX	"	**1,843,428**	**1428**	**124**	**323**	
						(Opr. KC1F)
W1KM	"	**1,741,922**	**1368**	**124**	**318**	
K1EA	"	1,634,165	1421	115	288	
W1RM	"	1,556,100	1195	130	325	
K1AR	"	1,366,182	1112	120	306	
W1DA	"	975,280	936	105	260	
K1XA	"	926,720	1020	91	229	
K1VR	"	837,375	754	112	273	
W1IHN	"	673,137	728	86	235	
W1BIH	"	452,100	497	100	230	
W1AX	"	448,448	533	96	212	
W1FJ	"	439,108	525	91	211	
K1KI	"	432,707	535	92	191	
K5MA/1	"	398,658	571	80	167	
W1GG	"	240,240	380	77	154	
K8HVT/1	"	225,600	362	74	161	
KA1DWX	"	220,560	347	72	168	
WA1UDH	"	196,251	346	65	144	
K1VUT	"	189,000	387	64	125	
AI1S	"	168,480	281	68	148	
KT1O	"	148,512	311	60	122	
W1WAI	"	108,368	205	67	141	
WA2CNF/1	"	101,808	236	54	114	
W1HX	"	89,739	192	56	113	
WB1AEL	"	89,712	223	46	98	
K1YRP	"	66,452	168	49	99	
N1AU	"	61,439	169	46	85	
W1OR	"	57,645	152	44	91	
WA1ZAM	"	48,375	151	39	90	
W1BR	"	47,029	137	41	90	
K1MEM	"	46,150	118	52	90	
W1CNU	"	44,296	126	38	75	
W1HUE	"	36,685	121	38	77	
W1OPJ	"	9,179	66	25	43	
N1CJK	"	4,365	34	16	29	
W1PLJ	"	4,033	40	12	25	
AI3E/1	"	3,654	33	15	27	
W1WEF	**28**	**1,431**	**23**	**11**	**16**	
WA1FCN	**21**	**61,146**	**228**	**19**	**61**	
W1YN	**14**	**189,375**	**521**	**33**	**92**	
W1XN	"	25,589	127	21	46	
K1TR	"	15,500	89	27	35	
K1BW	**7**	**314,360**	**746**	**35**	**110**	
W1PL	"	60,605	229	23	79	
KB1H	"	11,300	85	14	36	
W1FV	**3.5**	**99,495**	**356**	**23**	**76**	
WØMHK/1	"	2,240	36	10	18	
K1ZM	**1.8**	**19,323**	**135**	**14**	**43**	
W1CF	"	7,917	156	11	28	
						(Opr. N1EE)
K1MM	"	6,345	56	14	31	
KA1SR	"	539	23	5	6	
N2LT	**A**	**2,192,028**	**1703**	**119**	**325**	
W2VJN	"	**1,222,208**	**956**	**131**	**321**	
K2RD	"	**1,088,976**	**970**	**111**	**281**	
N2GC	"	769,064	722	111	272	
N2MM	"	768,432	812	92	244	
K2ZJ	"	421,740	550	79	191	
K2FL	"	344,858	463	84	185	
K2VV	"	290,656	402	79	169	
W2RQ	"	282,388	450	76	151	
W2TZ	"	280,539	465	65	154	
K2QF	"	217,384	345	77	155	
K2QIL	"	191,994	382	50	125	
N2MR	"	185,954	318	66	152	
W2NC	"	160,176	272	72	141	
W2PAU	"	143,349	246	63	150	
K2MFY	"	138,710	276	60	134	
W2NS	"	121,948	246	51	121	
K2JLA	"	111,687	242	58	119	
W2FTY	"	95,931	202	58	113	
N2AIF	"	93,353	204	58	109	
W2KHQ	"	72,473	195	49	88	
WA2VYA	"	69,408	177	48	96	
WA2ORX	"	69,350	172	47	99	
W2DW	"	69,300	187	46	94	
W2AYJ	"	65,469	192	43	96	
W2GKZ	"	34,568	120	42	74	
NA2Q	"	31,174	122	38	71	
KW2J	"	29,106	118	40	58	
KY2J	"	28,380	109	41	69	
W2PHT	"	26,200	95	41	59	
WA2WIP	"	21,056	99	36	58	
K2MN	"	16,932	78	29	54	
NF2K	"	10,800	56	27	45	
KC2QR	"	9,794	56	19	40	
W2AWF	"	8,277	85	23	50	
KT2D	"	7,320	55	24	37	
N2DRR	"	1,848	27	16	17	
KK2B	"	1,204	20	12	16	
K2EK	**21**	**276,727**	**782**	**28**	**93**	
KF2O	"	4,815	40	15	30	
K2WK	**14**	**187,566**	**497**	**35**	**94**	
KB2NU	"	24,187	125	22	45	
WB2SZY	"	21,045	124	17	44	
KA2MXO	"	20,215	114	18	47	
N2JJ	**7**	**30,504**	**126**	**27**	**66**	
N2UN	"	28,801	126	26	57	
W2HG	"	9,968	70	17	39	
K2SX	**3.5**	**34,320**	**165**	**20**	**58**	
K2JT	"	12,428	92	13	39	
W2YY	"	2,774	31	14	24	
W2BHK	**1.8**	**2,392**	**41**	**9**	**27**	
K3UA/2	"	1,067	28	7	11	
K3WW	**A**	**1,450,345**	**1201**	**121**	**300**	
K3ZO	"	**1,398,558**	**1219**	**115**	**287**	
N3AD	"	**1,351,607**	**1243**	**111**	**272**	
K3LR	"	1,300,650	1057	125	310	
W3XU	"	1,118,000	1156	92	252	
K300	"	1,031,638	962	115	264	
K3ZZ	"	748,200	776	103	241	
K3NZ	"	730,186	768	101	230	
N3CXV	"	505,076	627	90	196	
W3UM	"	482,304	547	98	216	
W30V	"	378,852	530	79	183	
W3UJ	"	368,010	497	83	195	
K3TC	"	359,788	456	87	199	
W3KV	"	341,628	424	93	201	
W3GW	"	280,714	347	91	190	
K3OX	"	211,725	353	74	151	
W3GL	"	177,156	289	74	154	
W3ARK	"	161,787	296	65	134	
WA3IMY	"	150,586	270	61	145	
K3PA	"	148,590	286	61	134	
W3EVW	"	141,693	242	76	143	
K2ITG/3	"	124,912	214	69	142	
N3AM	"	120,696	241	60	128	
AD3V	"	115,232	215	76	132	
W9KTP/3	"	114,729	241	52	115	
N3HW	"	109,681	247	56	113	
N3RW	"	67,760	170	53	101	
W3AA	"	66,738	178	52	95	
WB3CAC	"	63,404	185	41	90	
W3EAN	"	48,800	176	32	68	
K3IE	"	43,470	128	43	83	
K3NL	"	35,514	113	45	76	
N2MA/3	"	30,548	203	68	131	
W3SOH	"	29,808	116	38	70	
W3OD	"	26,950	103	29	69	
N3BNA	"	18,632	156	46	94	
W3FQE	"	4,850	39	20	30	
K3VK	**21**	**122,109**	**409**	**24**	**77**	
N3RS	**14**	**314,505**	**754**	**35**	**110**	
N3BJ	"	184,404	526	32	95	
W3GN	"	86,292	293	28	74	
W8FJ/3	**7**	**165,827**	**425**	**36**	**103**	
W3AP	"	133,750	374	36	89	
K3TW	**3.5**	**34,830**	**169**	**22**	**59**	
K3WGR	"	15,500	101	17	45	
K3ND	"	2,784	32	10	22	
KB3A	"	2,156	29	10	18	
AA1K/3	**1.8**	**6,512**	**61**	**13**	**31**	
W4RX	**A**	**1,663,305**	**1255**	**135**	**330**	
N4WW	"	**1,615,940**	**1323**	**127**	**303**	
						(Opr. N6AR)
K1ZX/4	"	**898,498**				
W3VT/4	"	824,172				
K4PQL	"	780,736				
N4EJW	"	457,704				
N4JF	"	385,800				
N4VZ	"	385,280				
K4XO	"	309,888				
N4KMY	"	201,476				
NQ4I	"	197,737	314	78	153	
WB4MAI	"	158,000	240	90	160	
W4BAA	"	156,168	322	57	109	
WB4FOT	"	147,183	320	54	109	
WM4Z	"	128,700	240	53	130	
W3NX/4	"	126,027	250	55	123	
K4OD	"	120,848	240	56	130	
W4LVM	"	112,728	209	60	124	
K4EZ	"	101,035	226	51	118	
N4IB	"	100,724	209	52	119	
WB4BBH	"	99,632	201	79	129	
W4KO	"	89,537	189	75	125	
W4YN	"	83,410	175	74	120	
KA4EQW	"	79,655	208	64	86	
N4KE	"	72,912	176	65	105	
K4FPF	"	65,975	161	58	103	
N4NX	"	61,545	162	50	91	
KC4GR	"	61,398	142	60	102	
K4CEB	"	40,131	123	41	85	
KF4CI	"	30,580	109	37	74	
NF4A	"	20,516	95	23	54	
WS4E	"	18,411	69	35	63	
W4DGJ	"	17,661	87	32	55	
KF4CQ	"	16,380	86	32	47	
N4IA	"	15,106	74	27	54	
K4KG	"	13,307	82	25	56	
WN4S	"	10,716	59	30	37	
NN4K	"	5,508	40	23	25	
W4UM	**21**	**228,384**				
WB4TDH	"	118,826				
N4MM	"	111,384				
K4JRF	"	12,376	70	18	40	
W4MO	**14**	**97,468**				
AA6DX/4	"	67,620				
WY4T	"	62,700	236	28	72	
W60KX/4	"	61,950	274	21	62	
KN4B	"	32,129	168	20	58	
W4BPP	"	288	10	5	5	
WT4A	**7**	**254,898**				
K4ISV	"	161,602				
WA4CTA	"	156,780				
N4CC	"	142,984	539	29	72	
N4XM	"	91,015	301	27	77	
W4YE	"	58,968	256	27	57	
W4BV	"	56,341	240	27	56	
WZ4Z	"	32,910	152	23	55	
W4FHI	"	3,150	126	27	62	
W1UA/4	"	1,410	26	13	17	
N4RJ	**3.5**	**69,258**	**350**	**25**	**57**	
W4XJ	"	20,538	275	19	43	
W4MGX	"	9,936	77	18	35	
N4SU	**1.8**	**9,604**	**110**	**16**	**30**	
KG4W	"	5,966	76	15	27	
K4UEE	"	4,864	75	15	25	
N4IN	"	4,592	67	14	25	
N5DU	**A**	**612,161**				

K5BDX	"	405,610				
N5RM	"	395,903				
KA5W	"	250,376				
W5OSJ	"	107,388				
NJ5N	"	102,795				
NI5M	"	87,856				
W5KCR	"	63,888				
N5UA	"	49,420				
N3BB/5	"	37,206	123	49	68	
NN5E	"	31,524				
W5ASP	"	26,880				
N2AIH/5	"	22,411				
K5FUV	"	11,954				
KA5IAU	"	4,741				
W5EIJ	"	2,494	30	21	22	
W5VGX	**21**	**176,596**				
K5TSQ	"	171,336				
AD5Q	"	99,004				
KI3L/5	"	65,450				
AC5R	"	5,842	49	19	27	
N5CR	**14**	**336,708**				
W5FO	"	222,267				
KE5CK	"	65,786				
N5JJ	**7**	**424,853**	**1019**	**37**	**106**	
K5MR	"	365,613	893	37	104	
K5LP	"	124,762				
W5RK	**3.5**	**35,840**				
K5UR	**1.8**	**28,032**				
W6TMD	**A**	**1,052,814**	**1265**	**107**	**187**	
W6DN	"	**386,805**	**572**	**93**	**148**	
KZ6E	"	380,855				
WC6I	"	295,290	646	73	97	
K7LJ/6	"	231,786	347	87	150	
K6DR	"	204,792	405	76	108	
N6AN	"	162,016	360	73	93	
W6ABW	"	155,428	316	76	106	
W2KVA/6	"	151,008				
W6OUL	"	134,075	278	71	102	
K6EID	"	106,795	256	68	87	
VE2AQS/W6	"	96,950	543	88	143	
AJ6V	"	91,834	240	59	87	
N6EK	"	88,060	230	60	80	
K6ZT	"	76,388	187	62	107	
W6MFC	"	58,750	172	52	73	
W6UE	"	58,546				
N6UW	"	57,517	191	53	60	
W6NKR	"	53,802				
W6BYH	"	43,732				
W6ISQ	"	40,150	128	39	71	
K9AGL/6	"	30,178				
N6HK	"	20,128	96	33	41	
K6CSL	"	12,711	91	30	27	
N6HR	"	11,560				
W6OES	"	10,856				
AA6EE	"	10,241				
W6AM	"	8,442	52	26	37	
W6SC	"	8,442	53	30	33	
K6LRN	"	6,696	42	23	31	
N6JM	"	2,800				
KJ6Z	"	1,035				
W6FAY	**28**	**5,814**				
W6YA	**21**	**189,810**	**579**	**32**	**82**	
NF6H	"	106,561	500	28	63	
W6YMH	"	4,401				
N6GG	**14**	**247,628**	**687**	**33**	**91**	
W6BH	"	247,324	704	34	87	
K6OMB	"	86,940				
N6RO	**7**	**376,301**	**1028**	**36**	**91**	
K6NA	"	343,035	871	36	99	
NE6I	"	100,848	398	31	57	
W7CB/6	"	46,176	162	44	60	
NC6T	"	38,033	190	28	45	
N6OC	"	18,194				
WB6JMS	"	17,080				
K5KT/6	"	11,058	104	16	22	
AA6AA	**3.5**	**92,131**	**375**	**27**	**60**	
N6TV	"	4,446	220	7	12	
K6SE	**1.8**	**7,500**	**150**	**12**	**18**	
W6RW	"	7,488	150	11	17	
NG6W	"	1,368	27	10	9	
W7IR	**A**	**1,016,099**	**943**	**130**	**253**	
W9SE/7	"	198,195	403	79	102	
W7AYY	"	179,894	351	74	113	
KS7T	"	174,699	442	59	82	
W7FGT	"	146,243	327	74	105	
W7IIT	"	106,533	279	51	82	
KX7J	"	75,970	196	51	91	
N7EPD	"	51,744	219	37	47	
W7DK	"	48,438	250	33	36	
W7IEU	"	42,075	155	45	54	
W7GUR	"	30,160	138	38	42	
W7QN	"	28,812	113	44	54	
W7EKM	"	20,150	113	31	31	
KA7FEF	"	18,292	104	35	33	
KA7OCW	"	15,123	89	36	35	
K7WA	"	6,825	67	15	20	
NC7D	"	1,326	20	13	13	
KE7C	**21**	**70,380**	**355**	**24**	**45**	
						(Opr. WB7OJV)
WB7FDQ	"	58,500	281	27	51	
KU7M	"	47,960	318	21	45	
N7RO	"	31,059	216	18	33	
KO7G	"	21,804	169	17	29	
KC7V	"	1,274	19	11	15	
KR7G	**14**	**138,570**	**524**	**30**	**63**	
KB7G	"	125,944	478	31	60	
K7ZA	"	110,740	387	31	67	
K7ABV	"	107,460	428	31	59	
KT7H	"	95,035	407	28	55	
WA7KPH	"	82,080	316	32	64	
K7IDX	"	6,534	71	15	18	
WA7KLK	"	4,992	44	15	24	
K7LXC	"	2,985	67	7	8	
AI7B	**7**	**169,723**	**649**	**32**	**57**	
N7RT	"	82,340	263	35	80	
WB7APW	"	24,624	172	20	34	
N7CW	**3.5**	**35,264**	**172**	**24**	**52**	
W7ZI	"	5,012	66	13	15	
W7DRA	"	1,402	46	9	8	
AA7A	**1.8**	**5,152**	**70**	**13**	**15**	
KA7T	"	900	27	8	7	
WA8YVR	**A**	**1,928,259**	**1464**	**138**	**321**	
N8II	"	**1,219,972**	**1136**	**107**	**270**	
K8NZ	"	1,106,638	980	121	282	
K8CW	"	728,717	817	106	235	
KE8M	"	181,745	299	74	149	
N8BC	"	154,200	282	66	134	
WD8OBP	"	138,180	268	62	126	
W8GOC	"	60,000	152	54	96	
K8CV	"	48,008	127	43	93	
W8UPH	"	47,286	162	40	71	
K8MR	"	45,543	123	51	90	
N8CXX	"	44,422	129	55	78	
W8YGR	"	36,378	99	45	84	
W8WVU	"	31,003	119	43	60	
W8EX	"	26,000	93	42	62	
N8EKS	"	7,434	48	24	35	
AD8W	"	4,128	38	17	26	
W8WPC	**28**	**8,550**	**89**	**17**	**33**	
						(Opr. N9AG)
W8QID	**21**	**75,043**	**262**	**26**	**75**	
KV8Q	"	54,684	210	24	69	
N8ET	**14**	**154,147**	**401**	**35**	**98**	
W8UVZ	**7**	**67,354**	**204**	**33**	**86**	
KZ8Y	"	35,156	134	32	62	
KC8PQ	"	1,672	26	7	15	
N8DPD	"	640	14	6	10	
K8MN	**3.5**	**19,698**	**115**	**20**	**47**	
K8VIX	"	8,684	69	15	37	
WD8IXE	"	5,130	45	16	29	
K8MFO	**1.8**	**3,180**	**44**	**9**	**21**	
W9RE	**A**	**1,349,172**	**1195**	**114**	**282**	
K9CAN	"	467,475	489	107	238	
KV9S	"	399,372	553	94	182	
W9OP	"	288,756	448	77	157	
W9GIL	"	288,344	391	83	183	
W9XT	"	256,762	395	79	163	
N8DE/9	"	252,582	370	87	171	
K9YAX	"	90,234	206	60	102	
NA9J	"	62,060	188	53	92	
K9MDO	"	51,408	143	51	85	
KO9W	"	22,560	89	38	56	
K9BQL	"	18,240	85	29	51	
W9GMV	"	14,356	72	40	52	
KC9FS	"	10,640	58	27	43	
KB9PY	"	3,760	38	19	28	
KA9QYA	"	3,560	32	18	22	
W9VA	**28**	**2,046**	**27**	**13**	**18**	
K9QVB	**21**	**70,967**	**246**	**27**	**76**	
AF9R	"	34,404	135	27	67	
W9WAQ	"	28,917	127	21	60	
KM9D	**14**	**307,024**	**875**	**33**	**91**	
KC9T	"	72,615	261	31	72	
KU9E	"	1,914	40	9	13	
KJ9D	**7**	**157,320**	**496**	**30**	**84**	
WB9POH	"	**154,330**	**455**	**33**	**89**	
W9OA	"	29,880	134	27	56	
N9EJL	"	4,042	38	15	28	
W9LT	**3.5**	**37,051**	**191**	**23**	**56**	
K9RS	"	33,336	176	20	52	
K9BGL	"	28,575	146	21	54	
W9RN	"	13,110	92	18	39	
W9PNE	"	10,123	74	16	37	
N9AW	"	8,084	70	15	32	
N9NC	"	2,805	31	11	22	
N9NB	**1.8**	**7,728**	**79**	**16**	**30**	
K9UWA	"	2,808	44	11	16	
KB8AC/9	"	110	18	3	2	
W8JLC	**A**	**1,182,432**	**909**	**136**	**316**	
W8WP	"	725,255	714	118	247	
K8UK	"	184,191	441	61	86	
KJ8G	"	182,240	385	63	107	
KS8U	"	89,586	197	56	102	
W8GOR	"	67,452	184	51	81	
K8IYF	"	51,750	148	47	78	
W8MCY	"	51,600	143	42	87	
W8RXL	"	45,012	145	50	74	
KS8T	"	39,816	129	50	75	
AL7H/M/8	"	37,335	111	50	81	
KM8R	"	37,076	117	48	76	
AB8X	"	30,422	110	42	64	
K7LFY/8	"	12,525	78	35	40	
AK8M	"	9,169	69	22	31	
KE8Y	"	3,040	20	17	21	
KE8NCE	"	540	16	9	11	
KD7EY/8	21	6,042	59	15	23	
N2IC/8	**7**	**236,610**	**736**	**33**	**77**	
K4VX/8	"	87,971	309	32	69	
						(Opr. KM9P)
KB8U	"	24,969	104	30	57	
AC8S	"	15,264	107	20	33	
WB8ISW	"	6,364	55	14	29	
N7DF/8	**3.5**	**51,354**	**257**	**25**	**56**	
W8JU	"	11,718	83	20	34	
K8CS	"	1,365	31	9	12	
W8ZV	**1.8**	**2,635**	**34**	**13**	**18**	

ALASKA

KL7RA	**A**	**783,863**	**1620**	**76**	**121**
KL7UR	"	81,507	310	43	58
KL7AF	"	41,152	277	31	33
KL7XD	"	27,000	335	14	26
NL7CT	"	2,400	40	12	12
KL7VZ	**21**	**27,692**	**446**	**12**	**11**
NL7DQ	**14**	**15,920**	**151**	**17**	**23**

ANTIGUA

KA2DIV/V2A	**21**	**208,590**	**982**	**24**	**61**

BERMUDA

N3RD/VP9	**A**	**3,668,256**	**3897**	**98**	**278**
VP9LB	"	151,086	944	31	47

BRITISH VIRGIN ISLANDS

VP2VCW	**7**	**396,888**	**1836**	**22**	**70**

CANADA

VO1MP	**A**	**249,458**	**551**	**50**	**137**
VO1AW	"	192,812	464	50	122
VE1AIH	**3.5**	**49,664**	**346**	**15**	**49**
VE2AYU	**A**	**456,111**	**776**	**66**	**177**
VE2WA	A	6,050	57	26	29
VE3DZV	**A**	**298,004**	**621**	**67**	**136**
XN3NBE	"	206,326	651	51	99
VE3ST	"	114,392	232	60	121
VE5AFX/VE3	"	95,310	487	37	53
VE3CWE	"	39,312	153	48	60
VE3UOT	"	29,815	142	38	51
					(Opr. VE3HTT)
VE3GWM	"	11,880	115	27	28
VE3OMU	"	11,016	99	25	26
VE2AEJ/3	**28**	**799**	**47**	**8**	**9**
XN3BMV	**7**	**436,100**	**1306**	**36**	**104**
XN3FRA	**3.5**	**98,124**	**610**	**22**	**56**
VE3OME	**1.8**	**12,056**	**280**	**8**	**14**
VE3MFA	"	10,420	251	8	12
XN3INQ	"	8,712	245	7	11
XN4VV	**A**	**161,025**	**706**	**47**	**66**
VE4AEX	"	58,344	246	38	64
VE4AIY	**14**	**17,550**	**184**	**21**	**24**
VE5XU	**1.8**	**2,844**	**162**	**4**	**5**
VE7WJ	**A**	**1,389,025**	**2055**	**103**	**172**
					(Opr. KE7V)
XN7EDU	"	62,937	330	36	45
VE7BSM	"	1,139	32	10	7
VE7IG	**3.5**	**100,595**	**778**	**20**	**35**
VE7BS	**1.8**	**4,688**	**142**	**9**	**7**

CAYMAN ISLANDS

ZF2AD	**A**	**123,824**	**860**	**34**	**37**

COSTA RICA

TI2CCC	**14**	**33,915**	**384**	**21**	**30**
TE1C	**7**	**519,480**	**2055**	**26**	**78**
					(Opr. T12CF)

DOMINICA

J73D	**1.8**	**2,304**	**59**	**6**	**12**

DOMINICAN REPUBLIC

HI8WRE	A	10,998	215	14	12
HI8OM	"	969	23	7	10
HI8JV	14	1,350	44	8	7
HI8JT	7	648	40	5	3
HI8A	**3.5**	**33,810**	**421**	**11**	**31**

GUADELOUPE

FG/VE3DAP	**A**	**462,528**	**1684**	**44**	**88**

HAITI

4V2C	**A**	**3,205,896**	**3722**	**117**	**255**
					(Opr. W8ZF)
HH2VP	"	1,818,600	2787	90	210
					(Opr. N4KR)

HONDURAS

HR1AT	**14**	**23,408**	**300**	**16**	**22**

MARTINIQUE

FM/W6SZN	**A**	**2,581,176**	**3624**	**87**	**225**

MEXICO

XE2MX	**A**	**1,465,671**	**2568**	**104**	**153**

PANAMA

HP1XKR	**A**	**640,226**	**1725**	**63**	**119**
HP1AC	"	103,500	486	42	58

PUERTO RICO

KP4HZ	**21**	**180,831**	**1053**	**23**	**56**
WP4D	**14**	**275,525**	**1167**	**29**	**74**

ST. MAARTEN

P46S	**A**	**438,504**	**1742**	**43**	**78**
					(Opr. K3UOC)
K2KTT/PJ7	**7**	**67,448**	**560**	**13**	**40**
					(Opr. KD2HE)

ST. MARTIN

FG0IKK/FS	28	120	20	2	1

AFRICA

CANARY ISLANDS

EA8URL	**A**	**419,825**	**828**	**49**	**126**
					(Opr. EA8AGH)
EC8ABR	A	157,545	399	42	93
EC8AHL	"	264	11	5	3
EA8RL	**3.5**	**207,823**	**905**	**16**	**61**

CEUTA AND MELILLA

EA9KF	**A**	**5,014,224**	**3835**	**109**	**329**
					(Opr. N6TJ)

DJIBOUTI

J28EG	A	8,398	76	13	25

GAMBIA

C53J	**A**	**812,352**	**1421**	**53**	**139**

MADIERA ISLANDS

CT3BZ	**A**	**49,622**	**197**	**36**	**50**
					(Opr. SM5GMG)
CT3DJ	**14**	**12,788**	**94**	**13**	**33**
CT3ET	**7**	**54,180**	**303**	**14**	**46**

MAURITIUS

3B8DB	**A**	**155,176**	**439**	**37**	**82**

REPUBLIC OF SOUTH AFRICA

ZS6BCR	**A**	**1,624,576**	**1804**	**92**	**212**
ZS2RM	"	310,460	501	67	148
ZS2U	"	54,780	65	15	22

SWAZILAND

3D6AK	**A**	**777,824**	**1208**	**74**	**144**

ZIMBABWE

5Z4DR/Z2	**A**	**73,984**	**364**	**21**	**47**

ASIA

CYPRUS (BRITISH)

ZC4CZ	**A**	**84,987**	**456**	**15**	**48**

HONG KONG

VS6TA	**A**	**1,809,310**	**2310**	**123**	**244**

ISRAEL

4X4NJ	**1.8**	**48,114**	**311**	**12**	**54**

JAPAN

JA1BWA	**A**	**1,099,280**	**1295**	**101**	**201**
JA1XAF	"	**1,040,841**	**1148**	**117**	**210**
JA1YFG	"	961,792	1193	101	185
JF1EQA	"	832,464	903	112	216
JE1AYU	"	442,260	673	88	155
JR1XFS	"	419,672	730	83	126
JF1SEK	"	258,456	527	77	101
JO1ITV	"	242,601	476	77	116
JE1ARQ	"	151,469	327	70	97
JH1MTR	"	127,072	311	67	85
JA1CJQ	"	83,230	218	56	89
JA1BNW	"	75,575	218	56	71
JA1BSU	"	70,180	138	51	65
JI1PCN	"	35,148	137	47	54
JG1GGF	"	24,192	125	32	40
JA1LDJ	"	19,272	125	27	39
JA4ENN/1	"	10,584	76	25	29
JJ1EEA	"	4,658	55	15	19
JA1AAT	"	3,237	39	15	19
JH1DIJ	"	2,150	32	13	12
JR1ZTT	"	1,147	19	15	16
JO1NZT	**28**	**4,448**	**64**	**12**	**20**
JF1NCT	"	987	18	9	12
JM1LWY	**21**	**79,920**	**325**	**26**	**64**
JA1EM	"	25,728	144	24	40
JA1DFQ	"	24,957	156	24	35
JA1JGP	"	10,258	85	20	26
JR1ISK	"	5,494	51	20	21
JF1OJC	"	3,948	51	12	16
JN1BDC	"	2,208	34	11	12
JH1CQV	"	297	11	5	4
JR1RNC	**14**	**222,860**	**707**	**34**	**76**
JK1OPL	"	204,573	644	35	76
JH1EDD	"	172,216	589	34	69
JA1EMQ	"	33,512	177	27	44
JA1HLX	"	26,255	165	23	36
JA1OP	"	3,381	55	13	10
JO1QZI	"	2,782	45	15	11
JG1EWE	"	760	14	8	11
JA1BDI	"	473	15	5	6
JF1COE	**7**	**36,024**	**167**	**27**	**52**
JA1THL	"	4,875	69	12	13
JL1EJO	"	100	5	5	5
JH1EDB	**3.5**	**47,520**	**272**	**24**	**42**
JA1SJV	"	9,751	76	19	30
JA1FGB	"	7,352	68	16	27
JA1QZC	"	2,187	32	12	15
JE1SPY	**1.8**	**896**	**22**	**8**	**8**
JA2MGE	**A**	**735,939**	**971**	**98**	**183**
JA2YDC	"	384,652	669	87	139
JA2FXV	"	178,782	405	70	96
JR2SOU	"	154,062	379	60	102
JA2SAP	"	105,570	243	70	100
JA2UOT	"	78,988	240	52	72
JH2KKW	**28**	**5,354**	**65**	**15**	**22**
JF2EZA	**21**	**110,356**	**434**	**29**	**65**
JA2LPA	"	11,952	95	20	28
JA2DHL	"	10,332	93	19	23
JF2DDE	"	8,892	80	19	19
JA2KPV	"	2,964	40	10	16
JE2LDO	"	1,860	36	10	10
JE2EIV	**14**	**88,822**	**367**	**29**	**60**
JF2FIT	"	242	12	6	5
JA2JW	**7**	**182,608**	**571**	**32**	**81**
JA2BNN	"	16,254	111	22	32
JE2SOY	"	1,386	25	7	14
JG2LGM	"	1,360	32	7	10
JA2AIR	**3.5**	**12,195**	**104**	**16**	**29**
JE2LPC	"	6,644	60	18	26
JH2XTV	"	406	13	8	6
JF3CCN	**A**	**200,962**	**438**	**75**	**103**
JA3ARM	"	103,410	292	54	81
JA3HTK	"	76,033	215	57	82
JR3XEX	"	42,713	142	54	67
JN1ENK/3	"	4,120	43	20	20
JF3GKE	**28**	**874**	**17**	**13**	**10**
JF3TMH	"	12	2	2	2
JF3UMP	**21**	**39,055**	**206**	**28**	**45**
JR3WXA	"	25,728	144	25	42
JE3SGE	"	517	19	4	7
JR3BOT	**14**	**131,882**	**502**	**30**	**64**
JR3IVR	"	44,398	199	29	50
JH3HBF	**7**	**27,885**	**161**	**24**	**41**
JH3BGG	**3.5**	**57,596**	**285**	**26**	**51**
JA3BCT	1.8	176	9	4	3
JH4DIT	**A**	**169,150**	**321**	**76**	**123**
JH4IFF	"	148,350	362	66	84
JA4ESR	"	63,250	208	50	65
JA4AQR	"	15,372	90	30	31
JH4UYB	**14**	**106,590**	**458**	**27**	**58**
JE4VVM	"	66,888	328	23	49
JR4VGD	"	27,594	161	23	40
JA4MKM	"	1,386	25	7	14
JR4PYZ	"	600	16	7	8
JA4YPE	"	80	5	4	4
JA5AF	A	9,450	63	33	37
JA5BQX	**14**	**33,864**	**176**	**22**	**51**
JA5BJC	**7**	**409,370**	**1097**	**34**	**96**
JA5IU	3.5	5,069	53	17	20
JA5JGV	"	1,664	27	11	15
JA6LDD	**A**	**192,240**	**391**	**70**	**108**
JA6BIF	"	152,255	328	70	99
JA6YDH	"	71,920	196	56	89
JF6JQM	"	7,360	62	21	25
JF6KAC	"	7,130	59	21	25
JA6AKV	"	4,068	44	14	22
JR6EZE	**21**	**166,075**	**645**	**26**	**65**
JA6YBR	**7**	**25,023**	**165**	**21**	**36**
JR6PGB	"	14,210	111	20	29
JA6WFM	"	14,056	95	21	35
JA6GGD	"	4,865	48	15	20
JR6GHN	"	2,496	39	12	12
JA6YGV	"	366	18	4	4
JA6JPS	**3.5**	**52,728**	**271**	**27**	**51**
JA6AD	"	27,072	170	20	44
JA6FGC	"	15,423	118	21	32
JR6LJO	"	5,069	53	17	20
JH7DNO	**A**	**958,964**	**1154**	**114**	**184**
JA7DLE	"	77,560	240	65	85
JA7ASD	"	21,440	101	37	43
JA7TJ	"	17,479	75	37	40
JA7AXP	"	6,532	55	22	24
JA7KM	"	2,000	28	12	13
JE7BIZ	**28**	**2,964**	**53**	**11**	**15**
JA7BIJ	**21**	**33,864**	**237**	**21**	**30**
JA7OYM	"	11,760	101	16	26
JH7WKQ	**14**	**76,107**	**402**	**26**	**43**
JH7BRG	"	44,319	204	28	51
JH7LVK	**7**	**106,314**	**439**	**28**	**59**
JA7OQQ	"	14,579	90	24	37
JA7UMT	"	8,300	61	23	27
JA7FFN	"	5,022	57	13	18
JA7UMT	**3.5**	**18,232**	**142**	**20**	**33**
JA7OUV	"	2,850	46	11	14
JA7BAL	"	1,350	13	8	6
JA7NI	**1.8**	**6,264**	**71**	**17**	**19**
JA7TQK	"	2,736	51	12	12
JA8KSO	**A**	**311,156**	**556**	**77**	**137**
JR8JTO	"	134,470	296	64	106
JA8SW	"	99,396	278	53	79
JA8AQ	"	94,392	202	73	111
JR8OJZ	"	86,790	195	69	96
JA8CIY	**21**	**26,901**	**163**	**24**	**37**
JA9JFO	**A**	**313,464**	**536**	**85**	**137**
JA9RPU	"	36,480	138	47	48
JH9CAV	"	19,339	94	36	47
JA9PBZ	"	3,680	39	15	17
JA9ZGI	"	1,147	19	15	16
JF3HKY/9	**3.5**	**20,414**	**140**	**20**	**39**
JA9CWJ	"	1,350	25	9	16
JA8CGJ	**A**	**178,178**	**382**	**73**	**105**
JA0UMV	"	6,975	56	22	23
JH0XUP	21	308	10	6	5
JH0LFE	**7**	**207,920**	**694**	**33**	**80**
JA0CIY	"	25,767	154	23	44
JA0YAK	"	8,288	88	16	21
JA0GZ	"	1,066	29	7	6
JA0DAI	**3.5**	**38,411**	**215**	**24**	**42**
JH0NVX	"	1,725	27	11	15

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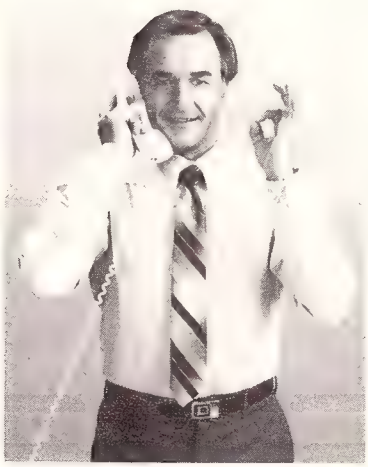

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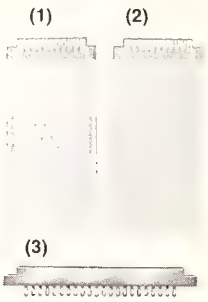


(1) Two-Bus PC Board. 4 1/2 x 9 9/16". Accepts up to 24 16-pin DIP devices. Fits 44-position socket. #276-190 . . . . . **5.95**

(2) IC/Discrete Board. Like above, but will accept up to 40 16-pin DIPs. Single supply bus. #276-191, **5.95**

(3) Socket for Above. #276-1551 . . . . . **2.99**

4000-Series CMOS ICs

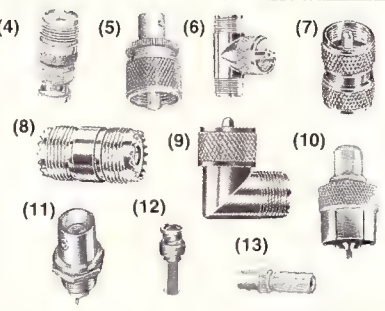
Full-Spec Devices

With Pin-Out and Specs

Type	Description	Cat. No	Each
4001	Quad 2-Input NOR Gate	276-2401	.99
4011	Quad 2-Input NAND Gate	276-2411	.99
4013	Dual Type-D Flip Flop	276-2413	1.19
4017	Decade Counter/Divider	276-2417	1.49
4049	Inverting Hex Buffer	276-2449	1.19
4066	Quad Bilateral Switch	276-2466	1.19

UHF Connectors and Adapters

Fig	Type	Adapts	To Fit	Cat. No	Each
4	UG-255/U	Female BNC	PL-259	278-120	2.39
5	UG-273/U	Male BNC	SO-239	278-121	2.39
6	M-358 "T"	SO-239	(2) PL-259	278-198	2.49
7	—	SO-239	SO-239	278-192	1.79
8	PL-258	PL-259	PL-259	278-1369	1.49



(9) Type M-359 UHF Right-Angle Adapter. #278-199 . . . . . **1.99**
(10) Solderless PL-259. For RG58/59 cables. #278-190 . . . . **1.69**
(11) 1094 Female BNC. #278-105 . . . . . **1.69**
(12) UG-88 Male BNC. For RG58. Solderless. #278-103 . . . **2.39**
UG-88 Male BNC. As above, but for RG59/62. #278-104 . . . **2.39**
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Inline Female BNC. For RG59/RG62 cables. #278-114 . . . . **2.49**

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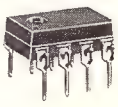


Include Pin-Out and Data

Type 741 Op Amp. Ideal for building your own CW/SSB active audio filter. 8-pin DIP. #276-007 . . . . **79¢**

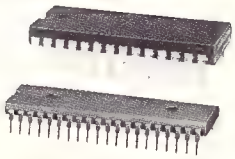
LM567 Tone Detector. For auto-patch tone and RTTY decoding. 8-pin DIP. #276-1721 . . . . . **1.99**

LM386 Audio Amplifier. Perfect audio output stage for homebrew receivers. 8-pin. #276-1731 . . . . . **1.09**

TLC555 CMOS Timer. Same pinout as standard 555 timer but very low power drain, typically one milliwatt at 5 VDC. 8-pin DIP. #276-1718 . . . . . **1.39**

Voice Synthesizer ICs

Now You Can Add Speech Output to Any Personal Computer or ASCII Terminal



SPO256-AL2. Preprogrammed with 59 speech sounds and five pauses. Complete data and application notes included. 28-pin DIP. #276-1784, **12.95**

CTS256-AL2. Converts ASCII characters into control data for IC above. 40-pin DIP with data. #276-1786 . . . . . **16.95**

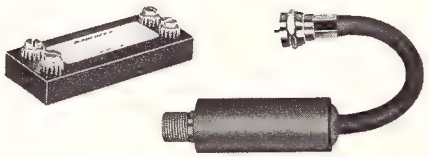
Jumbo 12/24-Hour LED Clock

27.95

1.8"-Tall LED Digits

Provides selectable 12 or 24-hour display and 24-hour alarm. Hi/lo brightness selection. Easy to set time and alarm. Battery backup in case of AC failure. Handsome appearance, too. UL listed. 9V backup battery extra. #63-675

Low-Cost TVI "Fixers"



300-0hm High-Pass Filter. Installs in-line at TV or FM receiver's 300-ohm terminals. #15-581 . . . . . **5.95**

75-Ohm High-Pass Filter. LC design. Installs in-line at TV, VCR or FM set's coax input. #15-579 . . . . . **3.95**

Micronta® Testers: Built-to-Last Quality!

Our Finest Analog VOM **49.95**

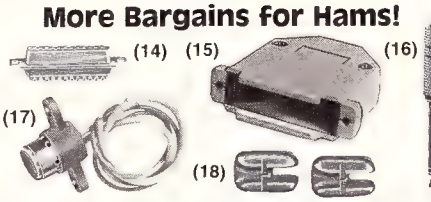
21-Range Analog VOM. Big color-coded scale, rugged construction. "Beep" continuity function, polarity reverse switch. Measures to 1000 volts DC, 1000 volts AC, DC current to 10 amps and resistance in 4 ranges. 6 11/16 x 5 7/16 x 2 5/8". Batteries extra. #22-210

Fold-Up Autoranging LCD VOM. You select the function, it selects the range. Diode check mode, autorange override. Measures to 1000 volts DC, 500 volts AC, AC or DC current to 10 amps and resistance to 2 megs. 10 7/8 x 5 5/8 x 1 1/2", open. Batteries extra. #22-193

Our Best Digital VOM **79.95**

Both models are fused and overload protected. Include probes and detailed owner's manuals.

More Bargains for Hams!



(14) 25-Position Male D-Submini Connector. Solder type for RS-232 hookups. #276-1547 . . . . . **2.99**

(15) Hood for Above. #276-1549 . . . . . **1.99**

(16) Headphone Adapter. 1/4" mono plug to stereo 1/8" jack. Use comfortable new mini stereo phones with Ham and SWL receivers, scanners. #274-348 . . **1.49**

(17) Electret Mike Element. Crisp, clean output. Ideal for mike repair, upgrades. #270-092 . . . . . **2.69**

(18) Antenna Insulators. "Egg" safety design. strong, low-loss material. #270-1518 . . **Pkg. of 2/69¢**

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CIRCLE 87 ON READER SERVICE CARD

KOREA

HL4XM	A	44,004	349	38	38
HL4CAE	14	15,876	152	21	28

KUWAIT

9K2BE	14	74,815	409	20	45
		(Opr. G4BWP)			

SINGAPORE

9V1TL	A	186,116	750	66	95
9V1WH	"	9,240	116	31	39

WEST MALAYSIA

9M2RT	A	155,474	454	86	105

ASIATIC USSR

ARMENIA

UG6GG	A	189,060	502	41	97
UG6JJ	7	16,807	118	13	36
UG6GAW	1.8	35,475	268	10	45

ASIATIC RUSSIA

UA9MR	A	483,648	824	86	213
UV9WW	"	538,575	942	51	164
UA9WYL	"	259,370	531	46	139
UA9OA	"	148,737	513	40	89
UA9QBT	"	82,636	221	35	111
RA9FA	"	75,224	292	35	99
UA9XS	"	64,960	258	32	80
UA9QP	"	30,008	147	22	66
UW9UM	"	26,163	129	26	55
UA9OO	"	12,218	61	26	56
UA9XF	"	640	12	8	12
UV9CM	21	64,524	441	17	40
UA9NP	"	36,102	233	19	47
UA9SF	"	35,720	280	15	32
UA9ND	14	263,648	884	33	79
UA9XAB	"	53,061	283	20	49
UA9ALD	"	32,376	180	24	52
UA9UPG	"	16,926	195	13	26
UA9OIQ	"	2,214	82	10	17
UA9CI	7	253,470	1060	30	75
UA9CJK	"	209,412	771	31	71
UA9YFG	"	135,548	596	31	72
UA9XR	"	50,786	276	27	40
UA9AFO	"	21,330	146	20	34
UA9YFR	"	9,177	230	11	21
UZ9AWZ	3.5	250,614	926	23	79
UA9SA	"	150,556	733	17	59
UA9AL	"	127,300	618	17	59
RA9YD	"	88,008	525	20	56
UA9CBM	"	76,325	410	18	53
UA9AJO	"	74,008	488	13	45
UA9AB	"	69,360	411	10	50
UA9FAR	"	38,900	283	9	41
UW9OA	"	17,908	163	9	32
UA9XFJ	"	5,655	77	8	21
UA9SBU	"	2,461	40	11	12
RA9AKM	1.8	35,751	262	10	41
UA9CDT	"	35,500	280	10	40
UA9KAA	"	28,128	240	11	37
UA9CBO	"	19,600	153	10	40
UA9SHO	"	4,380	60	8	22
UA0LCZ	A	469,238	1013	90	152
RA0JD	"	81,055	346	61	84
UA0AG	"	58,515	188	49	92
UA0UDC	"	53,417	361	35	56
UA0FER	"	31,498	415	17	29
UA0KCJ	"	27,996	245	21	43
UA0KBV	"	10,348	178	11	43
UA0SBQ	"	8,586	115	23	30
UW0CM	"	5,950	73	16	19
UA0ZCR	"	3,844	68	14	17
UA0ABC	21	25,536	213	19	45
UA0SAU	14	198,800	910	30	70
UA0QGZ	"	68,547	417	23	50
UA0QO	"	36,888	369	21	37
UA0SJO	"	22,568	191	19	37
UA0ABB	"	16,665	146	16	39
UA0SBL	"	14,006	134	12	35
RA0AA	"	13,728	127	18	34
UA0BDU	"	903	15	6	15
UA0LH	7	38,752	260	19	37
UA0SR	"	28,143	259	17	36
UA0ABB	3.5	27,105	212	20	45
UA0SGJ	"	17,650	193	14	36
UA0LCM	"	14,840	270	16	24
UA0SMM	"	5,587	107	13	24
UA0QCA	"	2,511	63	15	16

AZERBAIJAN

RD6DM	A	426,384	882	49	139
UD6DCA	14	4,002	60	7	16
UD6DJ	7	45,588	275	14	44
UD6CN	"	21,252	118	19	47
UD6DKW	1.8	11,766	117	8	29

GEORGIA

RF6FR	A	823,004	1007	46	136
UP2BM/UF	21	258,405	962	28	76
UP2NA/UF	14	175,968	622	29	75
UP3BA/UF	7	573,648	1755	27	87
UP2NK/UF	3.5	283,362	1230	19	64

KAZAKH

UL7CQ	A	146,349	402	40	121
UL7FDD	"	11,373	106	16	35
UL7CAZ	"	4,288	52	9	23
UL7PFH	"	1,541	44	8	15
UL7CAD	7	88,288	383	29	60
UL7AAS	"	73,080	373	16	56
UL7LCZ	3.5	146,328	724	18	60
UL7BAA	"	71,050	426	17	53
UL7EDR	"	34,500	278	9	37
UL7PEI	"	6,930	95	7	23

KIRGHIZ

UM8MBA	A	755,326	1119	76	202

TADZIK

UJ8JA	7	122,206	534	21	65

TURKOMAN

UH8BO	14	24,880	208	22	58
UH8EAA	3.5	210,820	1073	22	61

EUROPE

AALAND ISLANDS

OH0BA	A	1,772,692	2706	95	303
		(Opr. OH2BAZ)			

AUSTRIA

OE3RE	A	158,400	473	57	143
OE3DSA	3.5	85,608	993	14	58

BALEARIC ISLANDS

EA6GP	A	29,575	202	28	63
EA6ET	1.8	18,483	272	11	50

BELGIUM

ON4XG	A	117,629	461	34	117
ON7BX	"	28,714	234	24	74
ON6DF	"	11,395	182	13	30
ON6SQ	21	106,424	409	26	80
ON5TJ	7	9,858	128	11	42
ON5WL	3.5	5,740	155	6	29

BULGARIA

LZ1CW	A	357,294	719	72	210
LZ2VP	"	171,798	451	62	147
LZ1WG	"	132,899	523	55	112
LZ1AG	"	56,127	313	118	152
LZ2JE	"	42,716	187	60	120
LZ2EY	"	41,964	119	56	100
LZ1BJ	"	39,390	271	30	71
LZ2SO	"	4,500	40	20	30
LZ1JB	"	286	8	4	9
LZ1RN	21	15,808	181	17	47
LZ1XC	"	6,300	82	13	22
LZ1EP	"	2,610	55	9	20
LZ1FJ	14	1,704	51	6	18
LZ2RS	7	70,122	492	23	64
LZ1DQ	"	33,086	355	19	52
LZ1HY	"	18,084	181	14	52
LZ2RM	"	7,280	80	15	37
LZ1IA	"	6,439	98	15	32
LZ1PU	"	3,182	58	11	26
LZ2SD	3.5	3,840	85	8	32
LZ1KDP	1.8	78,088	656	17	69
LZ2CJ	"	60,844	568	16	66

CZECHOSLOVAKIA

OK3CGP	A	1,957,666	2132	117	349
OK6RA	"	1,298,440	1608	115	325
OK3OM	"	813,958	1385	91	243
OK2RU	"	530,400	1024	75	225
OK1DBM	"	400,158	949	75	205
OK3FON	"	246,675	492	73	202
OK1AJN	"	161,856	481	63	129
OK1IAR	"	153,594	530	51	156
OK1KZ	"	127,328	513	49	135
OK3CMF	"	122,963	387	52	131
OK1AWF	"	110,695	421	45	124
OK3TAY	"	96,390	299	44	86
OK2PCF	"	94,977	406	44	129
OK2PO	"	78,590	297	43	102
OK1AXB	"	76,930	310	47	110
OK1MKU	"	73,280	261	48	112
OK1MHI	"	66,528	397	28	98
OK1MZO	"	59,631	326	37	102
OK1DVK	"	55,584	165	50	143
OK2EC	"	53,280	196	47	101
OK2DB	"	47,520	165	40	95
OK1AWC	"	44,722	218	36	82
OK1ZP	"	44,714	213	36	61
OK3CAL	"	44,480	351	21	88
OK2BFX	"	42,136	312	22	70
OK1AJY	"	35,017	288	20	77
OK1DWC	"	30,988	219	31	91
OK3BA	"	27,645	242	23	72
OK1DMA	"	27,300	162	27	78
OK1DRQ	"	26,130	136	16	49
OK2AG	"	24,300	129	32	68
OK2PBG	"	15,051	112	26	61
OK2BCI	"	14,000	60	42	58
OK2KVI	"	13,937	82	22	55
OK1MIU	"	10,780	70	33	44
OK3CCC	"	9,604	199	9	40
OK1AOR	"	8,509	61	24	43
OK2LN	"	5,886	56	16	38
OK2SWD	"	3,392	41	20	33
OK1AD	28	1,652	29	10	18
OK2QX	21	20,800	123	21	44
OK3IF	"	3,390	40	13	17
OK2BTP	"	2,112	38	9	13
OK1TN	14	76,398	340	31	76
OK2BGR	"	50,964	283	25	68
OK1XW	"	43,761	318	25	62
OK1DHJ	"	29,718	223	23	55
OK3CAB	"	11,592	180	12	34
OK1MKI	"	7,869	140	12	31
OK2SKJ	"	3,710	60	12	23
OK2BBQ	"	3,234	71	10	23
OK1JDJ	"	2,490	33	12	18
OK3YX	7	336,896	1410	30	98
OK2BFN	"	277,982	1104	30	101
OK2DM	"	64,345	508	17	68
OK1EP	"	24,354	259	14	52
OK2BNX	"	23,760	185	22	50
OK1AZI	"	23,028	251	12	45
OK2ABU	"	12,012	169	13	39
OK3UG	"	8,510	105	12	34
OK1MAA	"	4,680	124	6	30
OK3ZBU	3.5	51,276	625	12	57
OK1AVD	"	47,886	573	13	56
OK1XJ	"	33,573	495	10	47
OK3CPW	"	17,472	336	9	43
OK3CEL	"	17,328	330	7	41
OK1OH	"	15,416	325	8	49
OK3CAP	"	14,893	253	10	43
OK3CGI	"	14,575	243	8	45
OK1DRA	"	14,500	290	9	41
OK3CDN	"	13,306	259	8	40
OK1DIE	"	13,158	219	8	43
OK3TDO	"	10,266	129	10	48
OK1DLB	"	8,946	196	6	36
OK1FCA	"	8,465	175	8	37
OK1DME	"	6,475	171	6	31
OK2BCZ	"	6,422	164	8	30
OK2PFX	"	4,366	104	6	31
OK3KYG	"	4,144	120	6	22
OK3ZWX	"	1,820	64	6	20
OK1DWX	"	893	47	4	15
OK1MG	1.8	22,464	308	10	54
OK2BWM	"	18,073	319	8	44
OK3CWQ	"	16,956	296	7	47
OK1DFF	"	16,884	271	13	54
OK1DFP	"	15,510	273	8	50
OK1DRU	"	12,336	249	8	40
OL8COZ	"	12,258	212	7	47
OK2BPU	"	11,550	215	7	43
OL1BIP	"	10,101	160	6	31
OL0COB	"	9,292	200	7	39
OK3CZM	"	6,975	80	5	25
OL9CPN	"	6,493	138	7	36
OK3BRK	"	5,715	103	8	36
OK1ATP	"	5,520	116	7	41
OK3CXS	"	4,992	131	6	33
OL9CPG	"	4,773	135	7	30
OL7BLO	"	4,587	146	4	29
OK1FZM	"	4,524	117	8	31
OL1BIR	"	3,740	110	4	29
OK2PGT	"	3,570	104	5	30
OK1AIJ	"	3,535	101	6	29
OK1DZL	"	2,610	91	4	25
OK2BQU	"	1,312	29	7	25
OL5BJD	"	1,175	48	4	21
OK1FAI	"	1,056	44	4	20
OL6BHV	"	450	26	3	15
OK3KFO	"	448	40	3	13
OK1DHE	"	306	19	3	14

DENMARK

OZ1LO	A	1,354,311	1773	109	332
OZ7HT	"	484,176	1074	67	197
OZ8AE	"	262,485	553	74	211
OZ5KU	"	219,225	480	78	159
OZ5XC	"	128,544	407	49	159
OZ1FFG	"	83,152	393	33	131
OZ7BW	"	63,758	187	54	88
OZ1CAR	"	62,431	307	40	109
OZ1III	"	44,544	261	36	92
OZ4RT	"	6,912	47	26	46
OZ9MM	"	4,947	95	13	38
OZ1ABA	"	3,952	36	20	32
OZ1FTE	21	21,200	104	25	55
OZ8CT	14	47,160	327	25	65
OZ7YL	"	26,656	219	23	45
OZ1BUR	"	3,496	40	17	29
OZ1APA	"	1,056	12	6	11
OZ2E	7	18,078	193	15	54
OZ1DVV	3.5	2,006	50	8	26

ENGLAND

G3FXB	A	1,489,714	1561	101	297
G3WPF	"	1,376,781	1855	97	274
G4BUO	"	881,781	1495	84	245
G4BUE	"	874,470	1515	77	232
G3VMW	"	858,476	1473	81	233
G3MXJ	"	690,850	929	84	253
G4CP	"	642,492	884	80	244
G3LNS	"	608,580	1016	80	235
G4UPS	"	534,145	950	78	259
G3PDL	"	533,235	1026	74	211
G4BKI	"	377,370	1098	51	159
G3KDB	"	351,175	775	67	208
G3ESF	"	218,816	648	54	154
G3JKY	"	80,342	359	38	101
G4UOL	"	51,000	292	34	116
G2AJB	"	42,840	303	38	88
G3XRX	"	18,330	152	31	63
G6QQ	21	5,016	69	12	21
G3URA	"	3,531	60	10	23
G3TBK	14	56,862	493	23	55
G4IUF	7	10,688	107	17	47
G3XWZ/A	1.8	22,034	215	8	38
G3ZRH	"	8,325	175	7	38
G4OBK	"	1,012	37	5	18

FAROE ISLANDS

OY7ML	A	400	8	7	9

FINLAND

OH2PM	A	661,248	968	98	286
OH4ML	"	631,202	1185	78	218
OH6YF	"	194,415	585	58	137
OH7EU	"	97,197	336	48	133
OH2BFV	"	93,408	423	44	124
OH2LP	"	88,620	279	53	157
OH2LU	"	86,730	261	46	101
OH2ZAR	"	73,884	346	36	95
OH8OB	"	59,776	258	33	95
OH5MQ	"	58,500	427	26	91
OH7SQ	"	51,125	226	37	88
OH6MM	"	44,298	271	34	106
OH2VZ	"	40,120	184	47	89
OH7NW	"	29,890	157	30	92
OH3NM	"	29,193	153	27	84
OH5PT	"	26,865	95	45	90
OH3MC	"	24,667	334	32	87
OH6KY	"	16,920	111	28	66
OH5FA	"	13,694	108	29	53
OH5BMD	"	12,640	145	22	58
OH5MX	"	9,492	83	24	60
OH2BSS	"	5,243	90	16	33
OH2BN	"	4,505	40	20	33
OH5JC	"	4,312	88	13	31
OH1UR	"	3,268	36	18	25
OH1ZH	"	1,292	26	10	17
OH2BXT	"	880	32	7	13
OH1PY	"	825	15	11	14
OH1FM	21	28,896	174	22	64
OH7MS	"	18,504	131	20	52
OH5RZ	"	18,200	133	20	50
OH5LP	"	11,937	101	20	49
OH3UW	"	6,912	63	16	38
OH6DZ	"	3,910	39	15	31
OH8ZX	"	3,828	50	13	31
OH5PA	"	308	8	7	7
OH8OS	14	715,692	2345	36	93
OH1SY	"	80,070	430	27	75
OH2BYS	"	52,452	303	27	67
OH6RC	"	28,700	220	20	50
OH3BU	"	28,677	256	21	58
OH6CD	"	18,414	215	15	39
OH3FM	"	10,062	147	13	26
OH7YN	"	9,604	149	13	36
OH5AF	"	2,782	86	7	19
		(Opr OH2BUU)			
OH2BJN	"	760	14	10	10
OH7NT/1	7	45,187	529	18	55
OH2HE	"	22,479	293	17	42
OH4YR	"	11,609	210	11	36
OH2JQ	"	5,764	88	11	33
OH2XK	"	5,673	55	15	46
OH6ZH	"	3,008	40	12	20
OH3RF	3.5	60,800	563	16	64
OH2BKF	"	1,242	40	6	17
OH3JR	1.8	20,355	298	10	49
OH3TQ	"	2,686	70	6	28
OH2QV	"	1,598	36	7	27

FRANCE

F6EID	A	579,690	792	94	248
FD1JCE	"	340,896	1153	55	157
F3JL	"	266,556	615	63	131
F5IN	"	185,814	638	56	130
F6DYX	"	119,400	638	48	102
F6HDI	"	96,096	329	41	113
F6ERZ	"	88,464	256	52	100
F6EPQ	"	66,856	375	42	80
F6HWW	"	44,992	156	46	102
F9BB	"	41,420	182	31	78
F5AH	"	27,892	194	27	49
F8TM	"	27,400	141	37	63
F3AT	"	22,960	157	28	54
F6GPA	"	17,745	120	27	64
F6GDK	"	12,528	133	22	50
F6CCI	"	12,354	112	23	48
F6API	"	6,540	77	17	43
F6KJG	"	975	25	6	9
F6AUS	21	10,277	106	17	26
F9DK	14	48,743	385	23	56
F2VO	3.5	2,592	56	4	20
F6BWO	1.8	28,246	428	11	47

GERMANY (FRG)

DL6FBL	A	1,847,310	2269	108	309
DL1YD	"	801,386	1116	90	247
DL6RAI	"	760,704	1254	87	249
DK3SN	"	592,970	828	82	219
DF3CB	"	428,060	803	87	253
DL1JF	"	410,835	703	77	228
DF4RD	"	393,432	714	84	228
DL3LU	"	369,396	614	85	246
DF0MM	"	321,768	942	67	179
		(Opr. DL8MBS)			
DK6NP	"	259,164	406	84	229
DL4FF	"	195,216	438	69	180
DL1TH	"	182,268	434	53	130
DJ1YH	"	139,065	352	60	159
DL1TH	"	126,453	434	53	130
DJ3TF	"	123,596	315	64	148
DL7CF	"	95,040	309	50	115
DJ9MH	"	92,115	271	63	114
DL5MBY	"	83,166	276	50	117
DK1DB	"	80,340	281	34	96
DL4NAC	"	75,795	299	44	111
DL8ZAJ	"	72,850	244	51	104
DK8AX	"	65,600	198	53	107
DL9JI	"	63,460	186	45	122
DL4KBM	"	59,632	385	35	84
DL3EBX	"	45,125	210	37	88
DJ0CP	"	38,808	183	32	66
DL3NAA/A	"	31,900	205	30	80
DJ2UU	"	25,520	190	27	83
DL3RAD	"	23,358	166	32	70
DL2RBK	"	21,854	161	31	67
DL1SBF	"	21,070	124	26	76
DL1AM	"	20,400	95	26	76
DK9BR	"	19,200	118	23	57
DF0SX	"	14,861	133	25	52
			(Opr. DL1SBR)		
DJ5AV	"	12,658	87	25	46
DF3QN	"	12,437	103	20	57
DK1PG	"	7,874	49	24	38
DL1NE	"	6,157	131	15	22
DL8AK	"	3,854	53	12	35
DJ7CY	"	3,128	26	22	24
DL6QW	"	2,911	32	14	27
DF2RG	"	2,673	46	13	20
DJ6RX	28	11,020	120	15	43
DL1RB	21	42,510	224	23	55
DL2JX	"	25,764	137	18	39
DL7YS	"	2,080	24	15	17
DJ9ZB	"	2,047	36	9	14
DL1VJ	14	337,631	1042	35	104
DL2HBX	"	92,082	388	28	75
DJ0YI	"	70,136	450	26	62
DK9MB	"	61,692	320	28	69
DF0AH	"	56,876	277	27	67
DL8KJ	"	33,189	216	21	48
DF7TU	"	22,236	162	22	46
DK8FD	"	7,860	142	10	20
DK0NH	"	627	25	8	11
DJ2YE	"	116	6	5	6
DK3GI	7	608,612	2035	35	107
DF3ZR	3.5	34,282	472	11	50
DL0XX	"	650	26	4	22
			(Opr. DJ2YE)		
DL2SAX	1.8	30,150	400	12	55
DK8NG	"	20,646	292	11	51
DJ6QT	"	17,400	287	10	48
DL8AAI	"	14,208	261	8	40
DK5OS	"	4,681	131	5	26

GERMANY (GDR)

Y47YN	A	356,708	1034	63	179
Y37UF	"	138,726	516	45	144
Y48UJ	"	97,053	407	42	131
Y75XH	"	72,900	333	37	98
Y22DK/A	"	72,842	318	43	111
Y41RF	"	66,980	226	50	120
Y24SK/A	"	61,722	226	51	111
Y53YN/P	"	58,135	223	51	100
Y25YA/A	"	51,084	295	35	94
Y56VM	"	50,179	199	43	96
Y25PE/A	"	42,126	305	28	90
Y23CM	"	39,600	157	41	103
Y53UN/P	"	37,030	162	42	73
Y34YC	"	34,093	118	49	54
Y49RF	"	33,330	175	36	74
Y38ZB	"	25,877	195	29	84
Y42YG	"	24,696	160	30	68
Y24EA	"	24,158	91	44	50
Y78VL	"	23,035	145	30	55
Y24KB/A	"	22,422	147	28	73
Y31PA	"	21,983	190	26	63
Y25TG	"	20,520	282	16	44
Y22HF	"	20,460	114	32	61
Y23JA	"	18,876	179	20	58
Y23RJ	"	18,642	170	28	50
Y37TM	"	18,245	134	31	57
Y42WB	"	18,040	161	28	60
Y22GC	"	17,374	89	30	43
Y37ZM	"	15,136	124	28	60
Y61UF	"	15,050	144	28	58
Y23HJ	"	14,190	165	22	64
Y540L	"	13,065	97	24	43
Y75ZH	"	10,790	152	18	47
Y49UF	"	10,584	96	20	36
Y36SG	"	9,894	77	19	32
Y36VM	"	9,639	55	33	48
Y51WO	"	8,760	80	26	47
Y51XH	"	8,710	82	21	46
Y33VA	"	8,427	132	15	48
Y23FK	"	5,814	57	18	33
Y22RK	"	5,457	107	13	38
Y31TF	"	5,358	62	20	37
Y26MH/A	"	4,410	43	18	31
Y25XL	"	4,067	72	13	36
Y39SH	"	3,915	35	21	24
Y59WF	"	2,755	65	8	21
Y21WI	"	2,201	33	14	17
Y22WF/A	"	1,053	25	10	17
Y23UH	"	962	48	13	13
Y61ZF	"	700	25	8	17
Y21HB	"	340	12	8	12
Y62NN	"	323	17	6	11
Y24DG	"	192	6	6	6
Y34SE	21	7,595	62	17	32
Y24MI	"	6,204	55	17	27

Y22UB	"	5,050	38	21	29
Y38ZG	"	243	9	4	5
Y51XE	**14**	**71,192**	**438**	**26**	**62**
Y26SO	"	42,180	220	29	66
Y43VF	"	12,732	171	28	47
Y38YE	"	11,346	100	18	43
Y25HL	"	7,700	175	11	33
Y21OL	"	4,600	40	20	30
Y21CF	"	4,182	48	17	34
Y32OC	"	4,032	81	12	24
Y22YE	"	2,706	39	13	20
Y24GB/A	"	1,947	27	14	19
Y37ZE	"	1,350	30	9	18
Y21FL	"	1,053	27	10	17
Y23BF	"	972	18	10	17
Y23HN	"	405	17	7	8
Y42ZB	"	378	15	7	11
Y62XG	"	304	11	7	9
Y24YH	**7**	**25,428**	**227**	**15**	**63**
Y22BK	"	10,680	150	13	47
Y21NE	"	6,992	130	7	39
Y21EA	"	4,836	106	8	31
Y27GL	"	3,978	67	9	30
Y53XM	"	561	35	3	14
Y54PL	**3.5**	**63,510**	**803**	**17**	**56**
Y55UG	"	34,136	465	14	54
Y43ZO	"	28,567	469	10	43
Y56ZA	"	27,898	441	11	47
Y32ZF	"	7,482	161	7	36
Y58ZA	"	4,970	135	7	28
Y34WF	"	759	31	5	18
Y26PL	"	722	40	4	15
Y24LA	"	320	18	5	11
Y39XO	**1.8**	**14,208**	**295**	**7**	**41**
Y22TO	"	10,906	264	6	35
Y37XJ	"	4,032	109	5	31
Y24SG	"	2,727	101	4	23
Y23DL	"	380	20	4	16

GIBRALTAR

ZB2EO	**1.8**	**9,108**	**172**	**9**	**37**

GREECE

J48AA	**1.8**	**7,889**	**144**	**7**	**42**

GUERNSEY

GU4WTN	**A**	**45,182**	**304**	**18**	**40**

HUNGARY

HA8MM	**A**	**809,898**	**1198**	**110**	**279**
HA7LM	"	253,176	730	58	173
HA3HZ	"	173,452	565	59	147
HA4XX	"	160,230	440	66	144
HA6OS	"	127,243	503	44	137
HA3NU	"	127,204	465	55	141
HA3GJ	"	84,336	335	49	119
HA3TT	"	26,572	147	32	59
HA3FLK	"	24,470	168	31	58
HA7SU	"	23,381	126	37	66
HA3IU	"	14,620	124	28	58
HA3HL	"	11,913	158	17	40
HA0HG	"	10,396	83	20	26
HA3GQ	"	7,626	74	24	38
HA5LZ	**21**	**44,806**	**200**	**27**	**59**
HA1SB	"	21,384	130	24	42
HA3NX	"	17,696	122	21	35
HA3GD	"	10,000	74	20	30
HA3MQ	**14**	**82,618**	**494**	**27**	**74**
HA3IB	"	66,740	388	27	67
HA7MS	"	49,297	263	25	68
HA4ZX	"	33,812	245	26	53
HA9RE	**7**	**261,729**	**1214**	**30**	**87**
HA7RB	"	75,435	452	25	82
HA3PT	"	54,560	426	15	65
HA8KQX	**3.5**	**210,240**	**1230**	**30**	**90**
HA1XR	"	83,160	900	15	53
HA1ZL	"	39,900	619	11	46
HA8LKC	"	30,267	475	10	47
HA6NL	"	19,376	297	8	48
HA9KOL	"	19,270	467	8	33
			(Opr. HA9PH)		
HA8CQ	"	1,875	73	6	19
HA1SE	"	800	46	5	15

ICELAND

W3TB/TF	A	11,088	126	17	39
TF3CW	**14**	**157,080**	**859**	**21**	**56**
AI5P/TF	14	14,960	151	13	27

IRELAND

EI4DW	**A**	**72,240**	**342**	**39**	**133**
EI3DP	**21**	**52,260**	**436**	**17**	**58**
EI1DH	"	37,016	425	13	43
EI7CC	"	20,458	232	13	40
EI9ES	**14**	**35,580**	**462**	**16**	**44**

ISLE OF MAN

GD5AVF	**3.5**	**7,000**	**110**	**11**	**39**

ITALY

I0ZUT	**A**	**32,766**	**232**	**25**	**61**
IK4DCS	"	8,360	120	15	29
I6PDY	**28**	**3,220**	**41**	**12**	**23**
IK2DVG	**21**	**230,608**	**807**	**30**	**86**
IK2CKR	"	138,320	672	30	65
I1KN	"	85,376	381	26	66
			(Opr. IK5AFR)		
I5MXX	"	71,995	364	26	59
I2MQP	**14**	**219,240**	**926**	**32**	**88**
			(Opr. I2VXJ)		
IY4FGM	"	196,272	959	31	85
			(Opr. I4IKW)		
I2JIN	"	119,280	480	31	74
I7PXV	"	66,394	553	24	65
I4IND	**7**	**361,472**	**1380**	**32**	**96**
I0I7LMR	"	26,104	397	10	42
I4EAT	**3.5**	**160,540**	**1008**	**22**	**70**
I3JSS	**1.8**	**37,386**	**481**	**10**	**57**

ITU (GENEVA)

4U1ITU	**A**	**1,361,120**	**2196**	**97**	**279**
			(Opr. K1CC)		

NETHERLANDS

PA0INA	**A**	**309,482**	**560**	**75**	**196**
PA0GT	"	182,720	359	66	166
PA0UV	"	86,507	315	42	115
PA0TA	"	55,970	189	44	101
PA3BTH	"	47,702	243	35	87
PA3BDK	"	44,850	207	35	93
PA3BNT	"	24,768	113	34	62
PA3BLU	"	20,553	118	33	60
SM6LQG/PA	"	17,466	73	22	42
PA3ACC	"	9,750	122	22	43
PA3CCF	"	7,749	82	24	39
PA3CNI	"	1,210	29	7	15
PA3DKX	**14**	**12,075**	**75**	**23**	**49**
PI5PVI	**3.5**	**9,240**	**100**	**10**	**50**
PA0DIN	"	3,315	81	9	30
PA3BFM	**1.8**	**35,070**	**425**	**12**	**58**
PA0PFW	"	15,249	287	9	42

NORWAY

LA1HCA	**A**	**93,885**	**377**	**44**	**121**
LA7SI	"	29,735	221	29	66
LA4DCA	"	1,332	32	12	25
LA8CJ	"	560	14	8	8
LA9ZV	21	84	11	3	3
LA4YW	**14**	**45,801**	**410**	**17**	**45**
LA5XDA	"	31,293	281	17	44
LA9GY	"	703	36	4	15
LA9SN	"	10,793	181	17	26
LA1VL	"	9,184	124	11	30
LA1EE	**7**	**76,516**	**496**	**24**	**70**
LA2CF	"	25,024	256	18	50
LA8WG	"	13,440	238	9	39
LA1PBA	"	588	25	5	16
LA5UF	**3.5**	**41,860**	**513**	**16**	**54**
LA7JO	**1.8**	**27,328**	**389**	**11**	**53**
LA4LN	"	4,288	130	6	26
LA5RBA	"	1,104	49	3	21

POLAND

SP4EEZ	**A**	**212,400**	**900**	**57**	**179**
SP7NJX	"	169,231	374	64	165
SP3HC	"	152,800	578	48	152
SP3BEJ	"	140,737	371	60	151
SP3HLM	"	120,988	323	68	135
SP4JWR	"	101,115	242	46	143
SP9BBH	"	83,658	387	38	108
SP9AKD	"	60,882	291	39	107
SP6CIK	"	60,048	214	43	101
SP3LWU	"	52,452	244	39	102
SP9DWT	"	52,274	245	37	81
SP3BYZ	"	47,460	151	47	93
SP8KJX	"	45,588	219	36	80
SP4GFG	"	42,344	198	42	92
SP8CEV	"	30,650	428	52	123
SP3KCL	"	24,675	138	36	69
SP2JXN	"	1,976	30	14	24
SP3KPN	"	70	6	4	6
			(Opr. SP3GXU)		
SP5BAK	**28**	**850**	**20**	**9**	**16**
SP5AD	**21**	**41,000**	**169**	**26**	**74**
SP5DDJ	21	37,412	167	25	69
SP5CJQ	14	85,488	822	28	76
SP9CTW	"	59,718	237	30	81
SP6BFK	"	16,464	151	15	41
SP9NLI	"	13,915	176	14	41
SP9AXY	"	3,276	65	11	28
SP6AUI	"	2,628	40	13	23
SP5JTR	**7**	**27,057**	**174**	**19**	**68**
SP9CVY	"	25,840	287	13	55
SP6AYP	"	15,312	87	19	68
SP5CWQ	"	14,580	154	13	47
SP6EVX	"	13,310	172	11	44
SP9ZD	"	4,720	76	10	30
SP3GIQ/5	**3.5**	**80,028**	**792**	**16**	**60**
SP3GEM	"	74,888	723	16	58
SP5CTY	"	70,528	765	15	62
SP4DGN	"	59,296	708	14	54
SP6CDP	"	39,975	630	11	54
SP4JSR	"	29,382	429	10	49
SP6PZV	"	20,650	396	8	42
			(Opr. SP6LMQ)		
SP8TQ	"	18,500	326	8	42
SP4DCR	"	9,348	231	6	32
SP1ADM	**1.8**	**23,606**	**380**	**9**	**49**
SP3IBS	1.8	11,352	253	7	36
SP5GH	"	9,724	170	7	45
SP9AOA	"	5,109	126	6	33
SP5INQ	"	1,148	28	7	24
SP9JRA	"	616	28	4	18

PORTUGAL

CT1BCM	**A**	**3,295,152**	**3108**	**123**	**344**
			(Opr. OH2BH)		
CT1CBW	"	324,710	853	51	139
CT1YH	"	5,600	46	23	40

ROMANIA

YO8QH	**A**	**188,760**	**808**	**48**	**147**
YO8FR	"	144,275	539	59	140
YO6AVB	"	16,200	107	23	36
YO6UO	"	5,301	44	21	36
YO4CBT	"	576	15	9	15
YO5BQ	**21**	**20,631**	**119**	**22**	**47**
YO3RF	**14**	**17,596**	**108**	**21**	**62**
YO8KGH	"	400	33	5	15
YO8DDP	**7**	**58,466**	**505**	**18**	**64**
YO9YE	"	22,308	221	15	51
YO2ARV	"	2,990	40	11	15
YO3YC	"	345	12	7	8
YO2DFA	**3.5**	**12,285**	**260**	**8**	**37**
YO5BLA	"	11,916	317	6	30
YO5CYH	"	6,620	197	6	20

SARDINA

IS0OMH	**A**	**96,841**	**596**	**31**	**82**
IS0MVE	"	93,452	530	36	86
IS0FPH	**1.8**	**13,754**	**287**	**7**	**39**

SCOTLAND

GM8SQ	**A**	**21,948**	**134**	**26**	**67**
GM3RAO	**14**	**22,310**	**317**	**12**	**34**

SICILY

IT9ZGY	**7**	**88,642**	**554**	**20**	**62**

SPAIN

EA2IA	**A**	**2,468,804**	**3041**	**95**	**299**
EA4BWN	"	184,984	642	47	105
EA5EXI	"	172,140	599	49	138
EA3BOW	"	166,980	565	44	121
EA5CF	"	145,457	503	65	102
EA1DAV	"	40,256	308	41	95
EA7XC	"	31,164	206	30	54
EA4CKV	"	30,906	217	33	72
EA3DWX	"	25,116	202	24	54
EA4CPI	"	23,572	146	26	57
ED5AR	"	21,690	99	36	54
EA7ADT	"	16,351	96	30	53
EA1NZ	"	8,908	73	21	68
EA4API	"	6,834	54	24	43
EA5CKP	"	5,070	64	13	26
EA3GF	"	1,534	33	9	17
EA4CQJ	"	1,530	30	9	21
EA7AZA	"	1,365	25	10	25
ED1CI	**14**	**27,885**	**271**	**17**	**48**
EA1ASI	"	4,995	99	8	29
EA7AE	**7**	**33,524**	**300**	**13**	**45**
EA2CR	"	14,446	162	15	47
EA1JD	**3.5**	**9,078**	**150**	**9**	**42**
EA3ALV	"	4,410	45	8	41

SVALDBARD

JW0EQ	**A**	**548,270**	**1476**	**56**	**162**

SWEDEN

SM6DHU	**A**	**276,138**	**762**	**80**	**181**
SM0BDS	"	138,744	436	50	138
SM5DAC	"	59,307	289	44	115
SM7NJJ	"	33,072	227	34	70
SM5RE	"	32,079	232	32	79
SM7CNA	"	27,370	145	37	82
SM4AZD	"	26,894	156	33	80
SM2NTU	"	11,011	80	29	48
SM7LAZ	"	9,600	100	22	42
SM6NWL	"	2,788	66	4	30
SM5IMO	"	1,824	24	19	19
SM5DUT	28	24	3	3	3
SM0FO/0	**21**	**10,962**	**127**	**16**	**38**
SM7TV	"	2,871	61	10	19
SM5AD	**14**	**151,749**	**598**	**32**	**85**
SK3AH	"	133,273	719	23	56
SM5CLE	"	65,484	361	29	73
SM0TW	"	30,408	237	24	60
SM0BVQ	"	23,030	173	21	49
SM2LCI	"	21,021	263	11	38
SM0BVQ	"	19,740	175	21	49
SM6JY	"	5,364	120	11	25
SM7AHW	"	5,289	106	13	30
SM5DYC	"	1,764	82	5	16
SM5CAK	**7**	**18,700**	**244**	**17**	**38**
SM5BRW	"	9,300	89	17	45
SM0MVX	"	7,176	123	10	36
SM6EAN	"	6,516	88	13	36
SM6CST	"	2,475	42	7	26
SM6CPY	**3.5**	**87,590**	**618**	**24**	**71**
SM6DED	"	21,949	440	8	39

SWITZERLAND

HB9AGA	**A**	**471,170**	**1057**	**75**	**190**
HB9QA	"	52,752	242	42	115
HB9CWA	"	14,664	105	29	49
HB9AGH	"	11,607	115	14	39
HB9DX	**21**	**12,432**	**63**	**23**	**61**
HB9KC	**7**	**29,250**	**261**	**14**	**61**
HB9APJ	**3.5**	**33,019**	**520**	**9**	**53**
HB9AMO	**1.8**	**60,680**	**660**	**14**	**60**

WALES

GW3JI	**A**	**182,952**	**586**	**51**	**165**
GW4TTU	**21**	**69,120**	**547**	**20**	**60**
GW3KYA	"	26,649	327	13	34
GW4PXQ	**14**	**13,095**	**259**	**8**	**37**
GW3MPB	**7**	**26,598**	**218**	**17**	**61**
GW3NYY	**3.5**	**33,701**	**431**	**12**	**55**

YUGOSLAVIA

YU3BC	**A**	**1,240,266**	**1430**	**114**	**307**
YU7PXT	"	326,500	790	72	178
YU2LLL	"	286,764	677	67	209
YU7AJD	"	214,940	605	58	162
YU1NZW	"	44,778	231	32	70
YU7ORQ	"	40,710	189	40	98
YU3JS	"	21,344	287	46	117
YU7DVW	"	9,315	107	18	51
			(Opr. YU7MGU)		
YU2CQ	**28**	**1,400**	**28**	**9**	**16**
YU3WY	"	1,056	22	8	16
YU1DW	**21**	**175,514**	**552**	**30**	**97**
YT3L	"	168,817	672	31	72
YZ2NW	"	72,168	289	32	66
YU4ABR	"	58,797	437	15	32
YU7AF	"	47,679	262	24	45
YU4GD	**14**	**539,760**	**1580**	**38**	**118**
YT3A	"	421,031	1320	35	104
YU7AV	"	388,088	1247	35	104
YZ2AW	"	350,901	1304	33	94
YU7NHT	"	7,130	95	13	33
YU3EY	**7**	**545,936**	**1676**	**36**	**113**
YT3M	7	390,888	1498	30	92
			(Opr. YU3EW)		
YU7AD	"	341,648	1221	31	100
4N3E	"	341,478	1669	30	92
			(Opr. YU3HAM)		
YU2SD	"	215,375	897	32	93
YU1FJK	**3.5**	**131,760**	**890**	**20**	**79**
			(Opr. YU1QGL)		
YU4EJC	"	119,451	888	20	67
4N2W	"	115,893	1127	17	62
			(Opr. YU2WV)		
YU3MM	"	88,720	850	17	63
YU3QI	"	46,789	562	12	59
YU7SF	"	41,535	563	11	54
YU7FN	"	16,464	310	8	41
YU2SWR	"	11,256	239	8	34
YU7AJH	**1.8**	**37,120**	**460**	**13**	**51**
			(Opr. YU7QDT)		
YU4YA	"	28,050	352	11	55
YU3EF	"	17,820	302	10	45

EUROPEAN USSR

BYELORUSSIA

UC2ACZ	**A**	**77,760**	**471**	**34**	**101**
UC2OM	"	46,652	314	29	78
UC2AS	"	25,645	191	29	86
UC2ACT	"	21,984	169	22	74
UC2AW	"	5,445	51	18	37
UC2AHL	"	121	9	3	8
UC2SMC	**14**	**14,307**	**161**	**19**	**38**
RC2AB	**7**	**43,665**	**507**	**15**	**56**
UC20BB	"	7,038	133	11	22
UC2OT	7	5,104	78	12	32
UC2WAZ	**3.5**	**23,479**	**396**	**9**	**44**

ESTONIA

UR2RQ	**A**	**118,221**	**443**	**37**	**120**
UR2RND	"	53,098	196	49	90
UR2RNG	"	36,292	349	18	68
UR2RER	"	11,502	81	30	51
UR2RBQ	"	3,536	65	11	41
RR2RU	"	308	8	6	8
UR2RE	**14**	**118,104**	**616**	**30**	**84**
UR2RZ	"	49,280	314	22	58
UR2RL	"	4,210	84	13	38
UR2FU	**7**	**162,015**	**904**	**28**	**77**
UR2RFG	"	33,225	222	25	70
UR2RLR	"	1,767	37	10	21
UR2RAH	**3.5**	**12,427**	**237**	**7**	**36**
UR2RIC	"	5,880	118	8	34

EUROPEAN RUSSIA

UW3HV	**A**	**1,233,936**	**1830**	**107**	**289**
UA3RAR	"	**551,889**	**1306**	**71**	**196**
OK3IA/UA3	"	243,504	617	72	195
RA3RN	"	125,976	300	59	173
UA4CM	"	125,610	489	70	170
UA3AGF	"	125,440	445	50	146
UA3AJK	"	125,290	536	41	129
UA4HDV	"	116,985	437	45	120
RZ3DM	"	69,890	296	51	94
UA6AX	"	62,478	234	41	137
UW3MW	"	51,984	360	45	71
UA4ALI	"	51,972	308	36	86
RA4PM	"	37,584	224	31	77
UA3AGU	"	35,682	187	32	82
UA3QAI	"	31,020	223	30	64
UA1QBE	"	23,933	204	22	69
UA6LGP	"	20,878	262	23	50
UA1DF	"	15,520	92	22	58
UA3SBV	"	15,120	120	26	58
UA4CAR	"	13,608	136	22	62
UA3IAK	"	9,869	107	19	52
RA3VA	"	7,747	71	19	42
UA3QOQ	"	7,738	106	17	36
UA3DMY	"	6,420	57	23	37
UA3TGO	"	6,222	73	18	43
UA4CHH	"	3,744	56	16	36
RA1OM	"	3,212	49	16	28
UA4CDY	"	2,342	62	6	20
UW3UO	**21**	**48,198**	**275**	**25**	**62**
UA3TAM	"	14,579	143	17	44
UA1DI	"	2,584	38	12	26
UA1ZD	**14**	**203,892**	**1041**	**23**	**55**
UA4LZ	"	64,885	427	26	69
UA3UAC	"	41,310	240	27	63
UA4HKJ	"	21,375	157	25	50
UA1ANA	"	20,832	228	18	44
UA3TZ	"	16,400	221	13	37
UW6HF	"	14,256	199	13	35
UA1QBV	"	9,225	149	18	27
UA1AJ	"	6,984	160	10	26
UA6UG	"	6,174	111	10	32
UA4WCE	"	4,576	64	11	33
UA4WF	"	1,541	37	9	14
UA1DZ	**7**	**299,915**	**1266**	**32**	**101**
RA1AO	"	111,444	594	30	81
UA4HNP	"	77,913	468	29	70
RA6LRT	"	70,272	439	24	72
UA3QBX	"	33,040	368	14	56
RV6AA	"	26,910	312	16	49
UA6WAV	"	18,158	204	21	60
UA6BPM	"	17,105	240	9	46
UA3AQW	"	15,696	256	12	36
UA4ADG	"	8,379	115	19	30
UA3TG	"	6,600	120	11	33
UA1AMF	"	2,720	64	10	22
UA3DNV	"	2,044	54	8	20
UA6ARX	"	2	1	1	1
RA4FA	**3.5**	**61,612**	**655**	**13**	**60**
UA4PCI	"	49,538	459	15	47
UA3XCH	"	47,200	452	21	59
RW3DW	"	26,460	409	11	43
UA6JY	"	19,800	275	16	39
UA6YCI	"	18,876	406	9	43
UA3DIJ	"	15,842	310	7	36
UA3IFR	"	13,200	218	9	40
UA3XBB	"	10,704	174	9	39
UA3ZGR	"	5,499	169	10	37
UA3ARI	"	4,680	153	7	19
UA3LAR	"	4,284	84	7	35
UA4AHT	"	3,828	87	8	25
UA3YAQ	"	2,976	78	8	24
UA4ANZ	"	2,626	67	7	19
RV6A8	"	1,740	55	8	22
UA3XBY	"	1,584	32	9	24
UA6BJF	**1.8**	**18,183**	**264**	**11**	**46**
UA3PFN	"	17,748	250	10	48
UA3LEO	"	15,450	258	9	41
RA1ASK	"	13,502	298	8	35
RA3DX	"	11,388	181	9	43
UA3TBM	"	9,632	169	8	35

FRANZ JOSEF LAND

UA1OT	**3.5**	**8,385**	**127**	**12**	**27**

KALININGRAD

UA2EC	**A**	**215,280**	**575**	**68**	**192**

KARELIA

UA1NAY	**A**	**50,735**	**286**	**34**	**105**
RA1NA	**3.5**	**16,500**	**256**	**11**	**39**

LATVIA

UQ2GDL	**A**	**443,091**	**1036**	**58**	**198**
UQ2GT	"	98,784	507	38	106
UQ2GD	"	56,406	272	45	113
UQ2GLW	"	41,943	243	40	83
UQ2GLY	"	37,801	301	27	86
UQ2GHG	"	19,173	158	20	63
UQ2GCP	"	11,475	127	20	55
UQ2GLK	**7**	**47,576**	**437**	**18**	**58**
UQ2GA	"	24,210	145	23	67
UQ2GN	**3.5**	**106,216**	**903**	**20**	**68**
UQ2GMR	"	15,960	341	13	37
UQ2GQ	"	9,338	166	11	35
UQ2GKM	**1.8**	**12,150**	**227**	**9**	**36**
UQ2GNL	"	4,239	150	6	21

LITHUANIA

UP2BO	**A**	**964,896**	**1755**	**92**	**276**
UP2BIO	**"**	**179,816**	**835**	**37**	**145**
UP2PAW	"	162,200	549	55	145
UP2BBF	"	138,376	533	54	142
UP2BKT	"	129,283	691	32	129
UP2PAQ	"	126,453	505	46	137
UP20Q	"	104,463	477	35	124
UP2DM	"	94,424	513	39	109
UP2BEN	"	69,120	566	21	87
UP2BEG	"	63,688	358	32	120
UP2BKZ	"	51,614	276	35	96
UP2BMQ	"	51,060	370	29	86
UP2PBM	"	45,403	355	27	76
UP2BEF	"	30,400	255	22	78
UP3BC	"	27,830	186	32	78
UP2BNY	"	27,280	293	16	64
UP2AV	"	11,645	109	25	60
UP2PCX	"	9,300	135	14	46
UP1BXA	"	8,990	112	19	43
UP2BOG	"	7,192	108	17	45
UP2BKN	"	996	51	3	12
UP20U	**21**	**18,486**	**127**	**20**	**58**
UP2BJM	"	14,733	77	24	55

UP2BN	**14**	**84,735**	**451**	**27**	**78**
UP2BFL	"	80,988	510	27	75
UP3BG	"	62,000	376	28	72
UP2BC	"	26,860	204	20	65
UP2BDX	"	260	15	5	8
UP2BKA	**7**	**70,830**	**545**	**27**	**73**
UP2BLE	"	30,303	223	22	69
UP2BON	"	10,944	135	20	37
UP2ND	"	10,800	172	11	37
UP2BLF	"	6,688	146	9	29
UP2BIM	**3.5**	**84,788**	**1005**	**14**	**62**
UP2PCI	"	71,064	840	14	58
UP2BEI	"	66,284	624	17	56
UP2BIW	"	47,322	610	13	53
UP2BFI	"	45,792	533	14	58
UP2BDF	"	44,268	545	13	55
UP2BOS	"	20,398	362	8	39
UP2BGR	"	12,144	240	9	35
UP2BHO	"	11,481	225	8	35
UP2BOE	"	6,560	130	7	34
UP2BZ	"	6,474	135	8	31

MOLDAVIA

UO5OA	**A**	**166,004**	**686**	**60**	**138**
UO5OKR	**14**	**25,296**	**345**	**16**	**46**
UO5GR	**3.5**	**11,554**	**159**	**10**	**43**

UKRAINE

UB5EC	**A**	**1,271,400**	**2040**	**94**	**296**
RB5IA	"	**309,885**	**767**	**66**	**217**
RB5AL	"	**196,224**	**741**	**48**	**171**
UB5IAN	"	189,888	792	46	146
UY5TE	"	170,982	696	50	157
UB5TAM	"	121,849	460	42	127
UB5TR	"	114,918	506	38	141
RB5EV	"	110,050	401	52	126
UT4UX	"	109,886	417	45	122
UB5JS	"	94,320	330	44	136
UT5HP	"	86,640	211	64	126
UT5UEW	"	80,898	378	35	104
UB5CBA	"	60,743	311	39	100
UB5ENV	"	60,248	315	33	103
RB5IQ	"	47,300	169	47	93
UT5SM	"	45,980	370	30	80
UB5DW	"	45,095	163	46	99
UB5VK	"	42,578	219	30	92
UB5IJK	"	38,024	304	23	74
UY5GG	"	35,000	200	34	91
UB5KDD	"	27,132	178	27	87
RB5QL	"	26,564	231	30	86
UB5QKQ	"	24,510	113	40	74
UB5REN	"	23,655	139	28	70
UB5MSF	"	20,076	204	20	64
UB5FFV	"	17,938	215	8	54
UB5ZFE	"	13,986	79	18	56
UT4UWC	"	9,710	176	11	38
UB5TCS	"	5,940	135	18	26
UY5JC	"	5,409	28	13	17
UB5VAS	"	5,336	38	24	34
UT5LN	"	1,176	28	10	18
UB5CCP	"	744	25	9	15
UB5IJG	"	660	14	7	15
RT5UO	**28**	**840**	**19**	**8**	**13**
RB5GM	"	350	10	6	8
UT5WW	**21**	**41,818**	**192**	**29**	**74**
RB5HT	"	10,400	66	26	39
RB5EG	"	7,738	78	17	36
RB5IZ	**14**	**252,765**	**1169**	**34**	**89**
UB5LAJ	"	122,436	704	32	82
UB5BZ	"	65,934	385	28	71
UB5QBL	"	47,940	304	24	70
UB5WCV	"	39,324	273	22	65
UB5QAY	"	31,350	302	19	56
UB5CN	"	26,568	200	19	53
UB5JNW	"	15,677	167	18	43
RB5AS	"	15,660	208	13	41
UB5ADN	"	9,374	158	12	31
RB5VL	"	4,944	51	16	32
UB5QKC	"	4,142	51	15	23
UT5BW	"	3,256	64	9	28
RB5IM	**7**	**422,664**	**1689**	**33**	**99**
UB5SBM	"	162,014	804	27	91
UB5CE	"	104,104	609	24	80
UB5FBV	"	103,774	774	26	80
UB5INT	"	61,809	200	13	49
UT5BP	"	56,674	427	20	46
UT5UDI	"	24,528	261	11	45
UB5KW	"	23,652	291	19	54
RB5QR	"	18,848	178	15	47
RB5VW	"	12,025	109	16	49
UB5EEP	"	7,224	115	13	30
UB5EPV	"	5,499	87	9	30
UB5FFQ	"	1,981	54	8	18
RB5CB	"	1,504	67	21	37
UT4UJ	**3.5**	**70,376**	**730**	**17**	**59**
UB5GBC	"	66,424	713	16	60
UB5ZX	"	56,168	661	18	50
UB5GBN	"	52,611	580	14	57
UY5OO	"	43,452	434	14	57
RT5UA	"	41,106	562	12	50
RB5SA	"	32,490	490	10	47
UB5MLP	"	19,656	294	9	45
RB5MA	"	18,350	297	8	42
UB5MPM	"	18,200	275	11	39
UB5MSQ	"	17,136	142	6	27
UB5FAN	"	11,760	240	7	42
UB5IBV	"	11,220	163	8	43
UB5QEB	"	7,301	191	9	40
UB5QJI	"	5,326	129	7	27
UB5XBD	"	940	45	5	15
UB5AEZ	"	490	49	5	14
UB5ZAL	**1.8**	**30,030**	**390**	**13**	**53**
RT5UY	"	19,703	283	10	51
UB5WF	"	19,278	331	9	45
UB5IPJ	"	16,576	246	9	47
UB5LCV	"	11,086	208	7	39
RB5DC	"	10,578	242	7	36
UB5MNR	"	10,086	246	8	33
UB5WCQ	"	9,768	246	8	29
UT5UBW	"	8,619	134	9	42
RB5AQ	"	8,208	213	7	31
UB5IUA	"	7,558	163	8	31

OCEANIA

AMERICAN SAMOA

NH6J/ NH8	**A**	**2,087,734**	**2945**	**103**	**139**
			(Opr. JE1JKL)		

AUSTRALIA

VK2BQQ	**A**	**490,175**	**891**	**81**	**111**
VK5GZ	"	184,375	429	51	74
VK3DNC	"	39,160	168	41	47
VK2GW	**21**	**98,698**	**554**	**40**	**61**
VK8XX	"	3,026	63	9	8
VK2APK	**14**	**261,237**	**960**	**28**	**65**
VK6AJ	"	81,928	337	24	53
VK6DU	"	42,108	331	21	23
VK5AGX	"	35,084	248	21	28
VK4TT	"	28,875	186	18	37
VK2CIA	**7**	**272,970**	**1029**	**28**	**62**
VK3MR	"	133,620	526	20	65
VK6HD	**1.8**	**3,335**	**46**	**11**	**18**

HAWAII

KN6ND	**A**	**1,851,525**	**2796**	**102**	**123**
KH6NO	"	988,739	1751	91	102
AH6AZ	"	433,752	938	74	85
KH6XX	**7**	**427,230**	**1424**	**33**	**68**
KH6IJ	**1.8**	**117**	**39**	**6**	**4**

INDONESIA

YB0ARA	**A**	**2,663,424**	**2373**	**125**	**259**
			(Opr. OH2MM)		
YB2ARH	"	843,744	1064	96	176
YB3ATB	"	84,257	267	37	72
YB4FN	**21**	**61,020**	**329**	**22**	**41**
YB0TK	**14**	**45,068**	**210**	**28**	**48**
YB5AQD	"	20,262	110	24	42

MARSHALL ISLANDS

KX6DS	**A**	**782,959**	**1687**	**62**	**95**

NEW ZEALAND

ZL3GQ	**A**	**2,756,467**	**2579**	**124**	**255**
ZL1AIZ	"	199,927	424	74	95
ZL1BXW	**21**	**157,392**	**739**	**23**	**49**
ZL2AH	**3.5**	**2,057**	**71**	**5**	**6**

OGASAWARA ISLAND

JD1AMA	14	2,392	38	10	16

PAPUA NEW GUINEA

P29PR	**1.8**	**495**	**21**	**5**	**4**

SOUTH AMERICA

ARGENTINA

LU1EWL	**A**	**347,072**	**880**	**56**	**80**
LU4FDM	**21**	**362,664**	**1274**	**28**	**80**
LU8DQ	**14**	**1,027,860**	**2699**	**37**	**111**

BRAZIL

PY4OD	**A**	**680,400**	**1335**	**61**	**121**
PY7ZZ	"	171,986	515	44	69
PY1QJ	"	116,875	370	35	40
PP2CW	"	76,960	351	35	45
PP7JCO	"	61,337	254	35	48
PY1YN	"	52,052	241	33	44
PY3BC	"	28,860	134	30	48
PY2RNJ	"	26,790	238	18	20
PU2KDL	"	21,182	215	12	22
PY5KN	"	11,880	77	16	38
PY3ENW	"	8,022	87	20	22
PY2OHJ	"	5,703	26	15	25
PY5AAT	"	4,437	57	12	17
PY5ZR	**21**	**403,627**	**1250**	**27**	**82**
PY2BTR	21	68,625	400	22	53
PY2RLQ	"	54,339	314	14	45
PY5MR	"	12,200	73	23	38
PY2FFW	"	5,967	55	16	23
PT2KT	**14**	**31,416**	**160**	**24**	**44**
PY1AYE	"	20,094	138	19	32
PT2ACZ	"	12,095	73	24	35
PY2LN	"	2,299	43	9	10
PY2MT	7	2,673	40	13	14
PY2CW	**3.5**	**13,515**	**91**	**14**	**37**

CHILE

CE8PD	A	23,595	127	32	33
CE5CNT	21	5,762	92	7	15
CE2BFR	**14**	**47,740**	**310**	**20**	**35**
CE1ANF	**7**	**29,610**	**250**	**19**	**35**
CE6GEY	"	5,451	82	12	11

COLOMBIA

HK1AMW	**A**	**731,855**	**1272**	**74**	**123**

EASTER ISLAND

CE0AE	**28**	**1,680**	**34**	**10**	**10**

NETHERLANDS ANTILLES

PA0JLS/ PJ2	**A**	**93,043**	**387**	**35**	**48**
NE8Z/PJ3	7	7,695	171	7	8

PARAGUAY

ZP5XDW	**A**	**296,922**	**984**	**46**	**56**
ZP5XGG	"	62,307	319	33	36

TRINIDAD

9Y4VT	**A**	**5,595,040**	**4290**	**124**	**316**
			(Opr. N6AA)		
9Y4W	**21**	**701,181**	**2052**	**30**	**87**
			(Opr. WA3LRD)		
9Y4VU	**7**	**546,735**	**1255**	**24**	**81**

URUGUAY

CX2AD	**A**	**92,400**	**297**	**50**	**60**
CX8DT	**1.8**	**1,332**	**30**	**8**	**10**

VENEZUELA

4M7QP	**28**	**14,980**	**192**	**12**	**16**
YY5A	**21**	**105,021**	**569**	**19**	**44**
YV4ABR	"	58,092	435	15	32
YV1TO	**14**	**418,698**	**1270**	**32**	**94**
YV3ALK	"	241,844	992	29	74
YX5A	**7**	**696,150**	**2003**	**29**	**88**
YV3AGT	**1.8**	**47,679**	**280**	**15**	**43**
YV10B	"	45,584	350	11	33

MULT-OPERATOR SINGLE TRANSMITTER NORTH AMERICA

UNITED STATES

K1ZZ	**2,773,744**	**1795**	**130**	**366**
K1RX	2,492,475	1760	137	364
KM1C	1,508,910	1212	116	322
KIXM	1,194,032	1087	110	282
AK1L	256,815	468	60	135
KR1R	91,120	249	45	91
N2RM	**2,052,705**	**1483**	**124**	**363**
W2GD	1,083,600	914	122	298
KQ2O	691,716	696	101	253
W2OW	389,512	521	85	184
KU2C	344,411	459	90	193
W2UI	315,732	446	76	177
W2XL	157,992	264	79	148
K2TD	49,833	139	52	95
W3BGN	**2,349,839**	**1594**	**143**	**380**
K3NA	675,894	695	112	269
KB3MM	494,405	536	92	213
W3NZ	414,986	537	83	203
KH3CP/W3	366,606	504	88	191
W3MA	290,520	391	85	184
K3UEI	160,975	257	80	155
K3II	106,745	202	56	129
W3YFV	17,328	88	31	45
N4AR	**2,445,534**	**1591**	**150**	**396**
K3KG/4	1,968,894	1359	143	370
N4KG	853,312	782	119	279
WA4JXI	561,558	632	109	237
WA4QQV	344,799	475	89	184
W4OO	205,084	320	92	144
WB4OSN	139,968	222	85	147
KA4EQW	79,655	164	64	115
K4KUZ	58,617	133	69	98
K5RC	**3,221,384**	**1998**	**160**	**402**
K5LZO	2,036,208	1579	136	336
K5RX	1,427,242	1159	134	303
KC5DX	388,969	484	101	206
K5RR	304,720	643	72	136
N6VR	**901,888**	**1183**	**103**	**168**
K6ZM	795,906	922	107	199
W6BIP	447,066	545	111	195
WB6ZHT	387,468	620	94	135
N6IC	216,540	373	83	131
K6TQ	200,900	365	78	118
AG7M	**553,194**	**893**	**83**	**136**
W6BJH	199,800	387	73	107
W8UA	**2,147,508**	**1514**	**137**	**356**
W8GWC	1,087,403	903	127	312
K8UNP	176,784	271	93	161
N9WA	**170,562**	**291**	**72**	**145**
KA9P	57,900	146	55	95
ND0E	**972,356**	**1132**	**111**	**197**
K0RWL	529,920	574	114	231
W0NA	235,235	367	79	156

CANADA

VO2WL	**539,840**	**1633**	**56**	**102**
VE3SOO	329,114	997	56	102
VE2CP	135,113	944	24	47

AFRICA

REPUBLIC OF SOUTH AFRICA

V9ADC	**1,442,220**	**1936**	**80**	**180**

TANZANIA

5H3BH	**4,036,290**	**3286**	**117**	**298**

ASIA

JAPAN

JA2YKA	**2,671,650**	**2126**	**144**	**306**
JA7YFB	**1,020,500**	**1158**	**118**	**207**
JA1YNE	**661,290**	**872**	**101**	**181**
JA7YAB	635,040	1056	87	129
JA1YXP	557,700	836	100	145
JA8YAD	**544,178**	**866**	**94**	**147**
JA1ZKL	525,139	816	100	141
JA7YFH	396,594	733	77	121
JH1YDT	353,192	610	80	132
JA8YBY	314,028	618	88	110
JA5YAV	**290,476**	**517**	**77**	**125**
JA1YAD	187,642	401	74	108
JA7YRR	94,380	374	47	74

SAUDI ARABIA

HZ1AB	**3,913,525**	**2997**	**124**	**351**

ASIATIC USSR

Asiatic Russia

UZ9SWY	**1,987,128**	**1889**	**104**	**282**
UZ9FWR	1,809,458	2122	80	227
UZ0CWA	623,954	1397	87	136
UZ0FWA	627,000	1136	90	138
UZ0QWA	623,392	1483	81	143
UZ9AYA	600,900	1454	37	113
UZ9XWW	443,112	1047	39	109
UZ9XWA	293,148	699	45	108
UZ9HWA	227,124	612	46	116
UZ9SXT	204,816	542	29	107
UZ0QWE	107,043	507	30	63
UZ9UWK	26,788	180	24	50
UZ0YWA	14,063	176	18	31

KAZAKH

RL8PYL	**2,753,604**	**2428**	**117**	**324**
UL8BWW	962,092	1508	69	175
UL8GWB	832,365	1326	80	185

KIRGHIZ

UM9MWO	**96,459**	**382**	**37**	**74**

UZBEK

RI0BWF	**74,621**	**450**	**22**	**49**

EUROPE

AUSTRIA

OE3GBB	**438,084**	**850**	**82**	**201**

BALEARIC ISLANDS

EA6URP	**140,352**	**569**	**46**	**126**

BELGIUM

ON6BR	**525,217**	**1444**	**53**	**156**

BULGARIA

LZ2KTS	**3,206,427**	**2983**	**139**	**398**
LZ1KRB	682,356	1358	84	219
LZ1KBL	287,240	1090	53	143
LZ2KCS	249,632	632	68	164
LZ1KTM	217,764	487	70	156
LZ1KAP	197,432	851	63	169
LZ2KKK	188,135	789	44	147
LZ1KAA	154,090	1036	21	74
LZ1KAZ	95,152	268	47	105
LZ1KRC	56,032	450	31	74
LZ1KKI	54,875	355	28	97
LZ1KMC	45,592	324	18	64

CZECHOSLOVAKIA

OK5R	**3,656,054**	**3037**	**143**	**443**
OK1KSO	**1,646,786**	**2043**	**101**	**325**
OK3KII	1,229,575	1790	91	268
OK3KAG	1,153,740	1726	101	301
OK3KCM	1,031,625	1485	106	287
OK3RJB	915,665	1439	91	276
OK2KQO	306,132	708	65	197
OK2KLN	217,210	698	57	146
OK3KTD	171,564	516	56	148
OK1KIX	95,200	367	50	110
OK1KYS	82,280	243	56	131
OK3KYR	72,174	253	41	97
OK1ALQ	66,198	326	38	80
OK1KNR	51,300	358	26	74
OK1KLV	18,549	208	19	62
OK2KNJ	17,696	156	26	53
OK2KZC	16,182	173	7	49
OK2KAN	18,824	129	27	45
OK1KWV	13,024	148	28	60
OK1KOK	9,672	114	18	44
OK1ORA	5,588	132	8	36
OK3KSQ	2,673	96	6	21
OK3KNS	210	15	4	11

DENMARK

OZ5EDR	**199,800**	**581**	**58**	**164**
OZ8JYL	125,588	676	39	125
OZ7DEN	79,800	417	41	79

ENGLAND

G4OTU	**309,980**	**980**	**58**	**162**

FINLAND

OH2VY	**1,841,644**	**2192**	**122**	**354**
OH5NQ	1,692,603	2074	117	334
OH7AB	1,068,418	1817	95	282
OH2BR	813,056	1116	97	300
OH1AA	671,490	1441	68	202
OH2AI	514,304	1010	81	247
OH2AQ	331,788	894	61	197
OH9AR	240,408	882	46	122

FRANCE

F3TV	**3,579,950**	**3130**	**126**	**380**
F6IWW	723,520	1486	77	195
F9FYA	304,874	1088	57	85
F6IGF	249,291	778	57	85
F6ENV	40,716	256	34	74

GERMANY (FRG)

DL1MAJ	**795,982**	**1142**	**90**	**283**
DL0IU	667,314	1159	78	205
DF0AFZ	652,194	1195	91	251
DF0BV	514,843	925	85	258
DL3HAH	447,950	1036	71	218
DL0WN	400,896	744	73	215
DL0LR	324,018	614	68	214
DL0ER	185,200	495	57	143

GERMANY (GDR)

Y35L	**1,173,930**	**2188**	**89**	**270**
Y43ZD	265,267	1095	54	145
Y67ZG	180,744	642	52	152
Y44ZO	101,579	405	49	108
Y31ZL	28,213	284	23	66

GUERNSEY

GU3HFN	**69,564**	**617**	**20**	**82**

HUNGARY

HG5A	**2,959,700**	**3227**	**111**	**314**
HG7B	2,583,999	2941	119	354
HG6N	2,518,845	2778	117	330
HG9R	2,290,869	2631	127	356
HG1S	966,960	1713	90	226
HG6V	937,380	1704	97	243
HA3KNA	687,834	1388	88	230
HA8KCK	591,282	1204	82	225
HA1KRR	580,203	1273	68	193
HA8KVK	536,540	1104	79	199
HA2KMR	475,046	1042	78	208
HA6KNX	356,570	986	75	192
HA8KWG	176,152	523	55	139
HA7KMP	97,012	406	44	114
HA5KDY	2,412	48	14	22

JERSEY

GJ0AAA	**2,111,472**	**3061**	**85**	**311**

LUXEMBOURG

LX9BV	**79,800**	**417**	**41**	**99**

MALTA

9H3DI	**886,039**	**2160**	**74**	**237**

NETHERLANDS

PA3CEF	**744,534**	**1864**	**66**	**266**
PA3ADJ	262,926	1247	33	129
PI4DEC	193,466	729	44	138

POLAND

SP2ZFJ	**712,974**	**1323**	**86**	**245**
SP6PAZ	264,228	590	64	163
SP9ZHR/9	98,936	395	46	120
SP5KVW	64,668	800	12	56
SP9KAO	42,959	305	31	88

ROMANIA

YO3KWJ	**734,184**	**1470**	**96**	**228**
YO5KAU	364,560	1082	64	176
YO4KAY	237,200	534	50	150
YO6KNY	4,970	145	9	26

SPAIN

EA3VY	**4,053,000**	**3802**	**119**	**381**
ED7BB	2,737,755	3209	104	311

SWEDEN

SK6RR	**814,113**	**1491**	**78**	**211**
SK5EU	760,362	1474	90	269
SK6JA	697,022	1396	74	224
SK2AU	685,720	1480	64	184
SK5AA	458,436	1100	68	185
SK7PI	95,680	320	49	111

SWITZERLAND

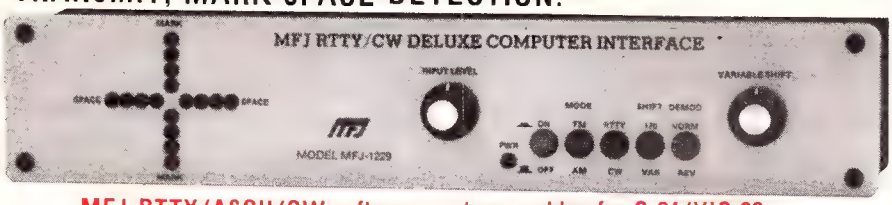
HB9BXQ	**538,350**	**1531**	**66**	**156**
HB9AJ	230,051	944	45	136

UNITED NATIONS (VIENNA)

4U1VIC	**432,400**	**1082**	**66**	**164**

NEW FROM MFJ

MFJ'S MOST ADVANCED RTTY/ASCII/AMTOR/CW COMPUTER INTERFACE HAS FM, AM MODES, LED TUNING ARRAY, RS-232 INTERFACE, VARIABLE SHIFT TUNING, 170/850 Hz TRANSMIT, MARK-SPACE DETECTION.



MFJ RTTY/ASCII/CW software on tape, cables for C-64/VIC-20.

MFJ-1229
$179.95

Engineering, performance, value and features sets MFJ's most advanced RTTY/ASCII/AMTOR/CW computer interface apart from others.

FM (limiting) mode gives easy, trouble-free operation. Best for general use, off-shift copy, drifting signals, and moderate signal and QRM levels.

AM (non-limiting) mode gives superior performance under weak signal conditions or when there are strong nearby stations.

Crosshair mark-space LED tuning array simulates scope ellipse for easy, accurate tuning even under poor signal-to-noise conditions. Mark and space outputs for true scope tuning.

Transmits on both 170 Hz and 850 Hz shift.

Built-in RS-232 interface, no extra cost.

Variable shift tuning lets you copy any shift between 100 and 1000 Hz and any speed (5-100 WPM RTTY/CW and up to 300 baud ASCII). Push button for 170 Hz shift.

Sharp multi-pole mark and space filters give true mark-space detection. Ganged pots give space passband tuning with constant bandwidth. Factory adjusted trim pots for optimum filter performance.

Multi-pole active filters are used for pre-limiter, mark, space and post detection filtering. Has automatic threshold correction. This advanced design gives good copy under QRM, weak signals and selective fading.

Has front panel sensitivity control.

Normal/Reverse switch eliminates retuning while checking for inverted RTTY. Speaker jack. +250 VDC loop output.

Exar 2206 sine wave generator gives phase continuous AFSK tones. Standard 2125 Hz mark and 2295/2975 Hz space. Microphone lines: AFSK out, AFSK ground, PTT out and PTT ground.

FSK keying for transceivers with FSK input.

Has sharp 800 Hz CW filter, plus and minus CW keying and external CW key jack.

Kantronics software compatible socket.

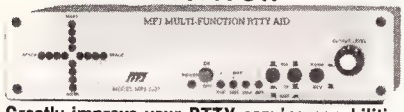
Exclusive TTL/RS-232 general purpose socket allows interfacing to nearly any personal computer with most appropriate software. Available TTL/RS-232 lines: RTTY demod out, CW demod out (TTL only), CW-ID in, RTTY in, PTT in, key in. All signal lines are buffered and can be inverted using an internal DIP switch.

Metal cabinet. Brushed aluminum front. 12½x2½x6 inches. 18 VDC or 110 VAC with optional AC adapter, MFJ-1312, $9.95.

Plugs between rig and C-64, VIC-20, Apple, TRS-80C, Atari, TI-99 and other personal computers. Use MFJ, Kantronics, AEA and other RTTY/ASCII/AMTOR/CW software.

MFJ MULTI-FUNCTION TUNING INDICATOR

MFJ-1221
$79.95

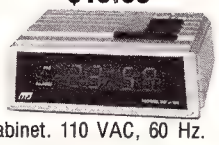


Greatly improve your RTTY copying capabilities. Add a crosshair LED Tuning Indicator that makes tuning quick, easy with pin-point accuracy. **Add** mark and space outputs for scope tuning. **Add** LEDs that indicate 170, 425, 850 Hz shifts. Great for copying RTTY outside ham bands. **Add** sharp mark and space filters to improve copy under crowded/weak conditions. 170, 425, 850 Hz shifts. **Add** Normal/Reverse switch to check for inverted RTTY without retuning. **Add** output level control to adjust signal into your terminal unit. **Add** a limiter to even out signal variation for smoother copy.

Unit plugs between your tuner and receiver. Mark is 2125 Hz, space is 2295, 2550 or 2975 Hz. Measures 10x2x6 in. and uses floating 18 VDC or 110 VAC with AC adapter, MFJ-1312, $9.95.

24/12 HOUR CLOCK/ID TIMER

MFJ-106
$19.95



Switch to 24 hour UTC or 12 hour format! Battery backup. ID timer alerts every 9 minutes after reset. Red .6 in. LEDs. Synchronizable to WWV. Alarm, Snooze function. PM, alarm on indicators. Gray/Black cabinet. 110 VAC, 60 Hz.

MFJ ELECTRONIC KEYER

MFJ-407
$69.95

MFJ-407 Deluxe Electronic Keyer sends iambic, automatic, semi-auto or manual. Use squeeze, single lever or straight key. Plus/minus keying. 8 to 50 WPM. Speed, weight, tone, volume controls. On/Off, Tune, Semi-auto switches. Speaker. RF proof. 7x2x6 inches. Uses 9 V battery, 6-9 VDC or 110 VAC with AC adapter, MFJ-1305, $9.95.

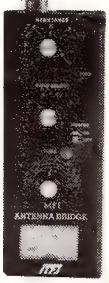
MICROPHONE EQUALIZER

MFJ-550
$49.95

Greatly improves transmitted SSB speech for maximum talk power. Evens out speech peaks and valleys due to voice, microphone and room characteristics that make speech hard to understand. Produces cleaner, more intelligible speech on receiving end. Improves mobile operation by reducing bassy peaks due to acoustic resonances. Plugs between mic and rig. 4 pin mic jack, shielded output cable. High, mid, low controls provide ±12 db boost or cut at 490, 1170, 2800 Hz. Mic gain, on/off/bypass switch. "On" LED. 7x2x6 inches. 9 V battery, 12 VDC or 110 VAC with adapter, MFJ-1312, $9.95.

MFJ ANTENNA BRIDGE

MFJ-204
$79.95



Trim your antenna for optimum performance quickly and easily. Read antenna resistance up to 500 ohms. Covers all ham bands below 30 MHz. Measure resonant frequency of antenna. Easy to use, connect antenna, set frequency, adjust bridge for meter null and read antenna resistance. Has frequency counter jack. Use as signal generator. Portable, self-contained. 4x2x2 in. 9 V battery or 110 VAC with adapter, MFJ-1312, $9.95.

MFJ PORTABLE ANTENNA

MFJ's Portable Antenna lets you operate 40, 30, 20, 15, 10 meters from apartments, motels, camp sites, vacation spots, nearly any electrically clear location where space for a full size antenna is a problem.

A telescoping whip (extends to 54 in.) is mounted on self-standing 5½x6¾x2¼ inch Phenolic case. Built-in antenna tuner, field strenght meter, 50 feet RG-58 coax. Complete multi-band portable antenna system that you can use nearly anywhere. Up to 300 watts PEP.

MFJ-1621
$79.95

MFJ 24 HOUR LCD CLOCKS

$19.95 **MFJ-108**

$9.95 **MFJ-107**

Huge 5/8 inch bold black LCD numerals make these two 24 Hour clocks a must for your shack. Choose from a dual clock that features seperate UTC and local time display or a single clock that displays 24 Hour time. **Mounted in a brushed aluminum frame,** these clocks feature huge 5/8 inch LCD numerals and a sloped face for across the room viewing. Easy set month, day, hour, minute and second function. Clocks can be operated in an alternating time-date display mode. MFJ-108, 4½x1x2 inches; MFJ-107, 2¼x1x2 inches. Battery included.

ORDER ANY PRODUCT FROM MFJ AND TRY IT-NO OBLIGATION. IF NOT DELIGHTED, RETURN WITHIN 30 DAYS FOR PROMPT REFUND (LESS SHIPPING).

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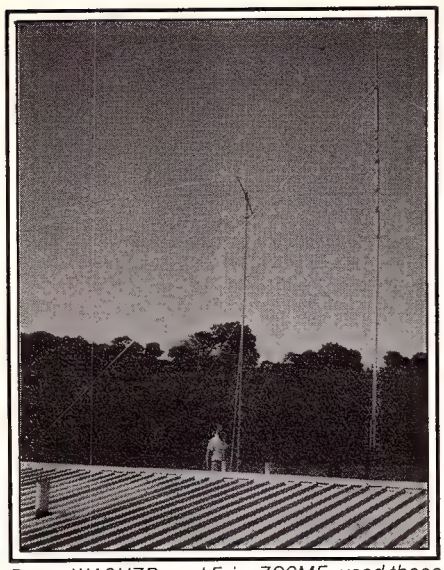
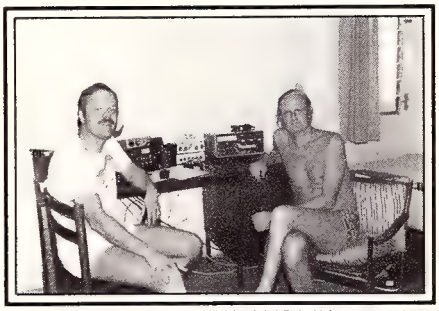


Dave, WA2HZR, and Eric, ZS6ME, used these fine antennas for their V9ADC effort.



John, SMØDJZ, and Leif, SMØAJU, operators at 5H3BH, put that rare zone 37 on for us in fine fashion.

These three 300+ DXers teamed for the F3TV multi-single effort. Left to right are Bernard, F9IE; Oliver, F6ARC; and Jackie, F6BEE.

YUGOSLAVIA

YZ4Z	**2,784,382**	**3819**	**109**	**345**
YT5A	1,756,398	2961	114	285
YZ2CRT	1,552,870	1903	103	317
YT3T	1,028,154	1666	89	260
4N2D	764,962	1184	88	231
YU2CKL	330,571	731	67	164
YU1EFG	301,896	820	61	191
YU4EZC	76,705	282	41	104

EUROPEAN USSR

EUROPEAN RUSSIA

UZ4WWB	**682,876**	**1391**	**80**	**236**
UZ1ZWI	**549,406**	**1196**	**61**	**160**
UZ3AZW	548,244	1256	77	214
UZ4AXQ	248,809	1062	53	150
UZ6AZR	229,551	510	41	316
UZ3WWW	215,481	828	56	161
UZ3AXX	180,891	637	58	141
UZ6LXM	141,052	525	46	133
UZ4AWB	103,108	466	42	107
UZ1TWB	97,071	503	33	108
UZ1CXA	89,780	409	26	108
UZ3QXU	51,574	359	30	77
UZ4WWC	47,321	392	22	57
UZ3DXF	37,950	280	24	86
UZ3XWM	21,507	273	15	52
UZ1AWO	9,680	172	10	34
UZ1AWJ	5,421	108	10	29
UZ4FWN	3,626	80	14	35
RZ6AWP	800	20	19	20

BYELORUSSIA

UC1AWC	**560,456**	**1297**	**65**	**252**
UC1WWF	386,712	956	66	196
UC1OWG	114,924	440	50	133
UC1WWX	1,478	88	4	13
UC1AWF	896	32	10	19

ESTONIA

UR1RWX	**2,058,549**	**2567**	**118**	**371**
UR1RWN	107,388	269	55	116
UR1RWQ	6,612	93	16	41

LATVIA

UQ1GWW	**1,721,874**	**2250**	**112**	**350**
UQ1GWY	203,341	705	50	183
UQ1GXF	146,376	585	38	114
UQ1GXW	89,377	529	31	108

LITHUANIA

UP1BZZ	**2,600,427**	**2634**	**130**	**413**
UP1BZO	1,256,234	1753	105	322
UP1BWW	1,140,156	1724	98	316
UP1BZA	1,126,352	1569	97	307
UP1BZG	1,049,653	1680	95	312
UP1BZR	713,394	1356	85	266
UP1BWG	455,520	1116	70	222
UP1BWV	128,674	479	46	136
UP1BXF	49,610	323	30	91

KALININGRAD DISTRICT

UZ2FWA	**2,149,152**	**2582**	**117**	**371**

MOLDAVIA

UO4OWR	**68,440**	**514**	**35**	**81**

UKRAINE

UB4IXB	**1,367,280**	**1865**	**119**	**313**
UB4XWB	980,850	2518	103	287
UB4MWA	482,477	1227	71	210
UB4QWW	459,928	1098	76	225
UB4LZA	331,056	1004	52	176
UB4RWW	196,803	789	52	145
UB4IWB	168,829	867	51	146
UB4MWU	82,397	442	34	115
RB4IXW	72,094	560	30	83
UB4IWR	72,090	412	32	103
UB4SWM	64,890	500	35	70
UB4EWE	58,424	280	37	97
UB4VWA	2,028	26	15	24

OCEANIA

AUSTRALIA

VI3WI	**359,388**	**912**	**51**	**83**

GUAM

KD7P/KH2	**4,487,665**	**3375**	**159**	**296**

HAWAII

KH6SP	**365,300**	**971**	**62**	**68**
W3HHG/KH6	131,097	496	44	45

OGASAWARA ISLANDS

JA3ZRT/JD1	**471,076**	**1224**	**57**	**74**

PHILIPPINES

DX1A	**2,076,704**	**2813**	**83**	**171**

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FYØGA	**7,617,235**	**5117**	**131**	**368**

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W3GM	**3,500,928**	**2122**	**151**	**425**
WØAIH/9	**1,723,711**	**1502**	**136**	**313**
N4ZC	**1,198,449**	**1123**	**110**	**263**
AA4S	766,840	728	113	267
K3ZUF	644,930	573	128	282
KF3R	380,635	469	85	198
W1BK	123,144	276	56	112

ALASKA

NL7G	**3,326,248**	**3963**	**116**	**212**

CANADA

XN3BVD	**2,996,269**	**3096**	**124**	**295**

AFRICA

CEUTA AND MELILLA

EA9CE	**9,170,984**	**6310**	**111**	**377**

ASIA

JAPAN

JA9YBA	**4,470,165**	**3301**	**149**	**334**
JA3YBF	**3,508,550**	**2735**	**150**	**320**
JA3YKC	3,041,948	2544	138	289
JG1ZUY	**2,402,016**	**2253**	**126**	**256**
JA7YAA	**1,119,906**	**1471**	**102**	**177**
JA7YCQ	425,036	671	96	140
JA7YWD	215,464	442	80	104
JA2YEF	53,751	171	60	63

EUROPE

FAROE ISLANDS

OY6FRA	**786,018**	**2424**	**62**	**207**

GERMANY (FRG)

DLØKF	**3,111,242**	**3369**	**127**	**387**

ROMANIA

YR6A	**1,234,467**	**2686**	**92**	**259**

SVALBARD ISLAND

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YUGOSLAVIA

YU1EXY	**5,529,092**	**4701**	**146**	**450**
YZ2CRU	768,892	1300	86	216

OCEANIA

HAWAII

KH6JS	**317,643**	**953**	**54**	**59**

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AA2Z/1	"	**192,864**	**365**	**60**	**136**
K3WS	"	**171,380**	**306**	**68**	**141**
UP2BL	"	**161,109**	**507**	**62**	**159**
UB5IJA	"	**119,024**	**475**	**41**	**131**
KA2AEV	"	**108,224**	**238**	**57**	**121**
W8VSK	"	103,488	214	58	118
YU3MJ	"	**101,244**	**394**	**45**	**111**
K7SS	"	**98,735**	**249**	**63**	**93**
W5VGX	"	**85,973**	**231**	**60**	**89**
DL8CM	"	**80,262**	**331**	**36**	**111**
SM1CNS	"	**61,200**	**292**	**38**	**115**
JA7AS	"	**58,006**	**224**	**46**	**51**
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I4KRF	"	**50,400**	**349**	**29**	**91**
UB5GJP	"	48,875	271	25	90
UB5POI	"	46,574	240	31	115
YZ1XC	"	**42,840**	**251**	**31**	**95**
WB9HRO	"	**35,750**	**129**	**42**	**68**
LA9PCA	"	**35,427**	**329**	**22**	**99**
KCØQ	"	**33,988**	**123**	**45**	**71**
UT4UB	"	33,800	282	24	76
OZ5WQ	"	**33,456**	**222**	**31**	**92**
AH6EK	"	**33,264**	**268**	**18**	**24**
YZ2EY	"	32,808	238	23	54
JH3LCU/1	"	27,534	136	35	43
UR2ROA	"	**26,400**	**259**	**21**	**67**
DA1JE	"	25,403	191	28	105
N8CQA	"	20,400	91	43	57
SM7KWE	"	17,556	176	24	52
SM4KL	"	13,973	143	20	69
K4RDU	"	13,446	75	33	50
Y26JD	"	12,544	247	8	41
Y27EO	"	12,144	165	11	58
WD5BRR	"	11,550	62	33	42
OK1DZD	"	10,787	131	21	46
PAØPUR	"	10,150	89	24	46
KFØT	"	8,954	59	32	42
PAØADT	"	7,936	87	18	44
LB3HC	"	7,622	192	11	25
LA1XDA	"	6,111	95	16	44
YO4BQV	"	3,243	60	13	34
UZ1AWW	"	2,926	67	11	27
PA3BUD	"	2,352	42	12	30
VE8PH	"	1,751	52	6	11
PAØATG	"	1,258	29	11	23
YU1PJQ	"	1,144	44	6	20
SM7CZC	"	986	25	9	25
KK7C	"	432	22	7	5
JH9HXF/1	28	1,392	23	10	14
ZS6PT	"	540	27	9	11
UB5RCA	"	180	7	5	7
YO6DDF	"	24	2	2	2
JF6TMH	"	12	2	2	2
UD6DF	**21**	**27,132**	**223**	**9**	**33**
EC8AFX	"	24,136	146	16	40
UR2CR	"	8,456	83	15	41
UB5FDM	"	6,028	82	13	31
W6MYH	"	4,401	59	14	13
OH3GD	"	154	12	3	8
JA2DN	14	49,050	244	25	50
JK1MAZ	"	48,412	237	25	51
JA2KVD	"	35,855	188	26	45
UA9AMF	"	**35,640**	**232**	**15**	**45**
JH2WIC	"	16,524	125	21	30
JA1BN	"	9,911	85	19	34
G3VMY	"	9,548	195	10	34
UA3TBY	"	6,216	143	7	30
RA9SUV	"	1,720	30	7	13
VK4SF	"	1,071	21	9	8
OZ8E	"	828	44	5	13
UA4PMW	**7**	**91,698**	**562**	**29**	**73**
OK1DCP	"	16,646	238	10	48
UB5CEI	"	9,646	114	15	38
UA1ZFT	"	3,325	75	11	24
UB5CGN	3.5	23,177	412	9	40
UB5UKH	"	18,648	274	9	47
UA3IDX	"	18,247	303	8	41
SP3EIY	"	11,266	271	9	37
RB5GD	"	9,555	174	8	41
Y25XA	"	8,272	171	7	40
YO5CYH	"	6,200	197	6	25
SP9GKM	"	6,072	175	6	27
YO4BEX	"	5,472	161	6	26
Y24KG	"	5,074	108	8	35
SP9IGY	"	2,938	114	5	21
YO5CUQ	"	2,548	100	5	21
JA1KFX	"	2,465	40	13	16
Y23OH	"	2,464	87	5	23
UA6BEB	"	2,414	57	6	34
UC2CAM	"	1,776	56	8	16
Y25MG	"	1,428	53	3	25
YO8CMB	"	1,300	50	5	20
LZ1IF	"	870	58	5	10
UAØSNR	"	8	3	2	2
UQ2GMB	1.8	9,786	212	8	34
RB5WW	"	8,040	180	9	31
UC2WBM	"	6,720	180	7	25
OK1DRO	"	6,194	166	5	33
UA3ATY	"	5,952	161	7	25
OK3IAG	"	4,800	118	7	33
UO5OJM	"	4,056	148	6	20
OK3CTQ	"	3,876	112	7	27
UA3YBJ	"	3,081	70	9	30
OK2PAW	"	2,970	105	4	26
UC2WO	"	2,574	104	6	16
UA9AJX	"	2,520	60	9	21
RL7LCT	"	2,418	54	7	14
RW3DR	"	1,298	60	5	17
RP2BIH	"	546	45	3	11
UC2LCV	"	520	40	4	9
JR6IQI	"	80	7	5	5

CHECK LOGS

Our thanks go to the following stations who sent check logs: CT1YH, DJ3VC, EA5YU/EA8, EA6NZ, EA9KQ, FE-9780, HA1KTK, HA1SD, HA1UI, HA5FA, HA5UK, HA7KMP, HA7KPW, HA7RB, HA7UJ, K9UJ, KE6VL, KH6JOI, KP4BJD, LA2EG, LA2KD, LA2QM, LA3BX, LA4BBA, LA6LX, LA7HJ, LA8CE, LA8XM, LAØEH, LZ1EO, LZ1FW, LZ1KHK, LZ1KHY, LZ1NS, LZ2KB, LZ2KRT, LZ2XD, N2RT, N4LS, OD5LX, OH1XX, OH2EJ, OH2SE, OH2XB/W6, OH4YC, OH5LJ, OH6AK, OH8LP, OH8LQ, OHØPA, OK1DIJ, OK1DZJ, OK2BCJ, OK2BJR, OK2PIO, ON5CW, OY2YL, OZ1EUO, OZ1FVL, OZ1JNR, OZ4RS/A, OZ5MJ, OZ5PA, OZ7GN, OZ8JD, PAØLKR, PAØPO, PI1GOE, PI5PVI, PP5AVV, PU2NGL, PY2BTR, PY2ILG, PY3CJI, PY5BVG, RA3AR, RA3EA, RA3EF, RA3VM, RA3VO, RA4AG, RB5CU, RB5LM, RB5NT, RB5UA, RB5VV, RIØBWJ, RL7GE, RT5JH, RV9UV, SKØRQ/5, SM2LWU, SM3QJ, SM4CMG, SM4OTI, SM5APS, SM5BDV, SM5CBM, SM5DQC, SM5LL, SM6CDN, SM6KMD, SM6LPF, SM6NJK, SM6NWL, SM6OOI, SM7EJ, SM7HEC, SM7IDF, SMØBFJ, SMØCMH, SP1JRG/1, SP2BIK, SP2GUV, SP2HFL, SP2HGG, SP2JGK, SP2JGR, SP2MHB, SP3ELD, SP3KTC, SP3XR, SP4EAK, SP4ETO, SP4MPB, SP5ATO, SP5BAK, SP5BR, SP5CBA, SP5COK, SP6BST, SP6CC, SP6DVP, SP8FNA, SP8GSC, SP8JMA, SP8MJ, SP8PRL, SP9ADV, UA1OBQ, UA1OBW, UA1OGA, UA1OGI, UA1ZFG, UA2FF, UA2FFA, UA3AAJ, UA3ACJ, UA3AMV, UA3DL, UA3DQH, UA3DQS, UA3ECR, UA3EDQ, UA3GDJ, UA3LCC, UA3MDV, UA3MDX, UA3MED, UA3PAN, UA3PB, UA3PCZ, UA3PDW, UA3QKQ, UA3QLC, UA3TFT, UA3VAQ, UA3VGY, UA4ANR, UA4CDX, UA4CGF, UA4CLT, UA4CM, UA4CMF, UA4HFK, UA4HJA, UA4HLD, UA4HLX, UA4MX, UA4PML, UA4YB, UA6ADH, UA6HH, UA6HKN, UA6HO, UA6PCH, UA6YW, UA9C8R, UA9COJ, UA9DC, UA9FD, UA9FKM, UA9FKZ, UA9MDV, UA9SAA, UA9SP, UA9UCO, UA9UON, UA9UOZ, UA9URF, UA9WFB, UA9YGD, UAØBCK, UAØSLN, UAØWAE, UAØZDE, YO4DCF, UB4DWW, UB4PWR, UB5ECB, UB5FDG, UB5GBW, UB5GFT, UB5HFU, UB5IS, UB5JLJ, UB5KBV, UB5LAL, UB5QGD, UB5QJA, UB5UFD, UB5VAA, UB5WAB, UB5ZFX, UBØKA, UC2LB, UH8ED, UL7BO, UL7LFL, UL7TJ, UM8MB, UP2BH, UP2BHP, UQ2PG, UR2RCU, UR2RJE, UR2RKQ, UR2ZN, UT4UC, UT4UH, UT5UCK, UT5UFI, UV3A8C, UV3DN, UV9FB, UW3EG, UW6HA, UW9AO, UW9CL, UW9CM, UW9SM, UWØCE, UWØCW, UY5GM, UY5PC, UZ1AXT, UZ2FWZ, UZ3DXW, UZ3DZF, UZ3QWX, UZ4AWD, UZ4LWA, UZ6LYV, UZ6PWA, UZ9AYG, UZ9AZB, UZ9CWW, UZØSWM, W3CV, W4NM, WA4DGI, WBØGOB, XN1ACK, Y21BC, Y21DH, Y21UD, Y22LL, Y22UO/A, Y22YJ, Y23RB, Y23RM, Y24TG, Y24XD, Y25IJ, Y25TO, Y26ML, Y26WM/A, Y26XM, Y27IO, Y31OJ, Y310N, Y31XN, Y32JK, Y33TB, Y33VL, Y36XC, Y37XJ, Y37ZK, Y38ZM, Y39TH, Y41WM, Y41YN, Y44WF, Y47YM, Y48ZF, Y51YJ, Y52ZD, Y54UI, Y54YD,Y54ZA, Y55UG, Y55XL, Y56ZN, Y67YL, Y75YL, Y78ZN, YCØVM, YT7W, YU2AKW, YU2CDS, YY4DDT, ZF2AD, ZL3AGI.

Disqualifications: Excessive duplicates and unverifiable contacts: EX6F, LZ2BW, LZ2ZF, LZ1KVV, OH1RY, ZF2IB/4X.

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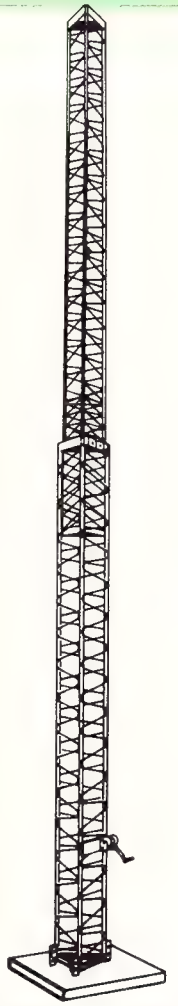

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Here's a relatively simple conversion of a popular workhorse. W5QMA makes very good use of EIMAC's 3CX1200A7 in updating the Drake L4B into a great DXing machine.

A Quick Conversion Of The Drake L4B For Use With A 3CX1200A7

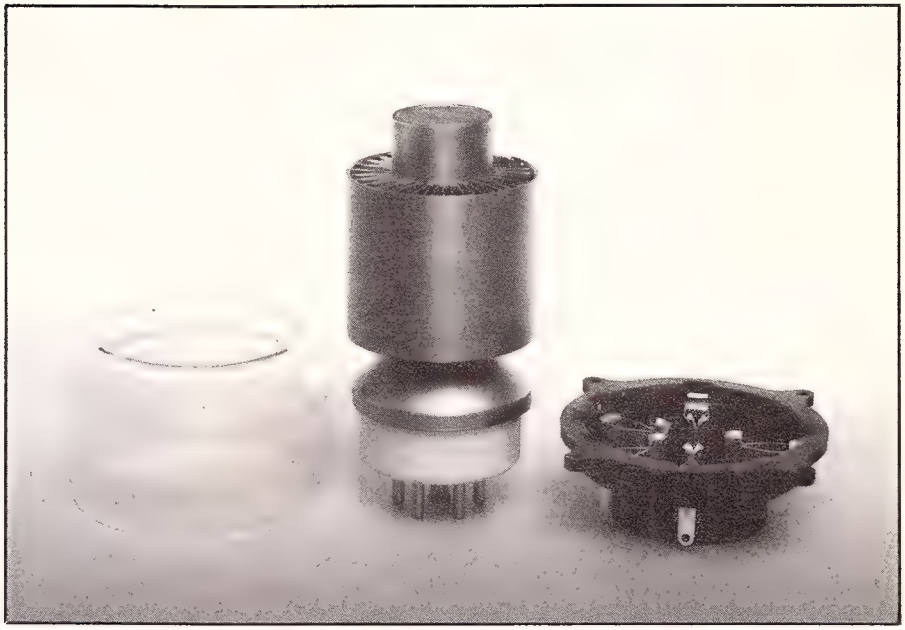
BY PETE WARREN*, W5QMA

This article deals with the conversion of a Drake L4B from a pair of 3-500Z's to one 3CX1200A7 at full legal limit and the exploration of other possible conversions. The power supply constructed for this article is intended to serve for any amplifier utilizing this tube or even a pair of them where such is legal and needed.

While I have designed and built many commercial high-power amplifiers over the past 10 years, it has been over 25 years since (at age 16) I last built an amateur amplifier. Some months ago I vowed that if I ever built another amateur amplifier, it would be solid-state. Then I saw tentative data on the 3CX1200A7 and knew I had to build an amplifier employing one. I called to order a tube and technical data immediately and waited impatiently. Meanwhile, a friend told me of an L4B minus power supply available at a somewhat reasonable sum, and I decided to try a conversion.

The technical data and the tube arrived and the project was on. Since Peter Dahl is in El Paso (my QTH), I discussed the power supply with him and settled on a hefty design that would allow experimentation (2800–5400 volts, 1.8 amp with a capacitor input and bridge rectifier circuit). I acquired two different filament transformers, one for the L4B conversion (7.5 volt 21 amp, a wire-for-wire replacement for the Drake), and one 7.5 volt 42 amp for future experimentation.

*6200 Valeria, El Paso, TX 79912

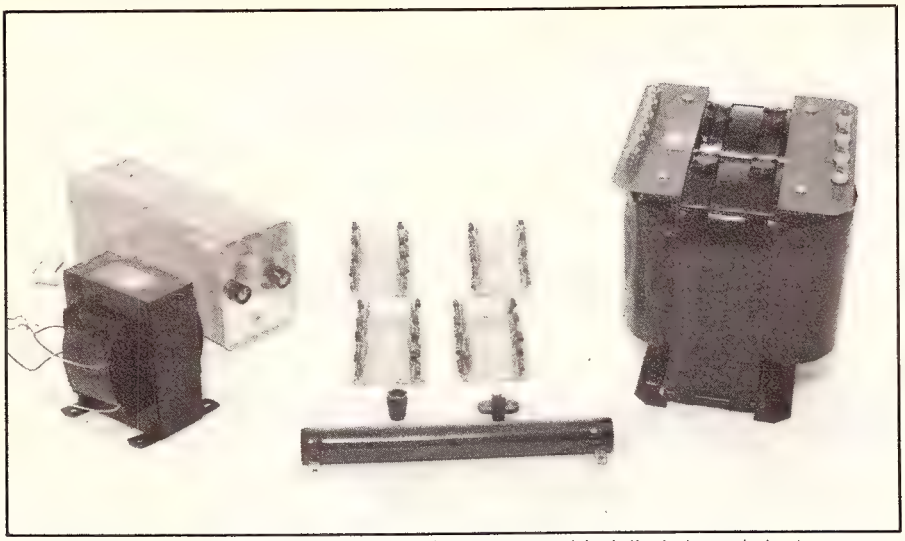


The heart of the conversion is the EIMAC 3CX1200A7. You'll need the glass chimney, too. However, you can use one of the existing sockets in the L4B. (Photo courtesy of Varian/EIMAC)

The 1200 is a beauty of a tube with proper care and feeding. Since the grid dissipation is rated at 50 watts, this means there is no real need for a grid trip circuit (compared to 3CX800A7 with 4 watts and other similar tubes). Tube warm-up time to full power operation is three seconds, so no time-delay circuits are required.[1] How simple can you get! The resonant load impedance of the 1200 (see Table I) is only slightly higher at 3 kv than the corresponding impedance of a pair of 3-500's and the L4B in particular. The tube is rated a power gain of 20 at 4 kv. You *will* require the SK-346 chimney and a 2 inch hose clamp.

Test Results

The power supply was connected to the L4B with the simple modifications I



Major power-supply components. Note the preassembled diode boards in the center. These components are available from Peter W. Dahl Co.

shall describe in detail later in this article, and testing was begun.

Band (in meters)	Plate Current (in amps)	Input Power (in watts)	Output Power (in watts)
80	.55	1925	1300
40	.68	2375	1450
20	.63	2205	1450
15	.74	2590	1700
10	.70	2450	1400

Table I– Amplifier characteristics when output is measured into a dummy load with 3500 volt plate voltage applied under load, CW.

On SSB with 3600 volts under load, all bands yielded 1500+ PEP. The input to the L4B was monitored for SWR and found to be less than 1.4 to 1 on all bands. Playing with the input impedance and the out-

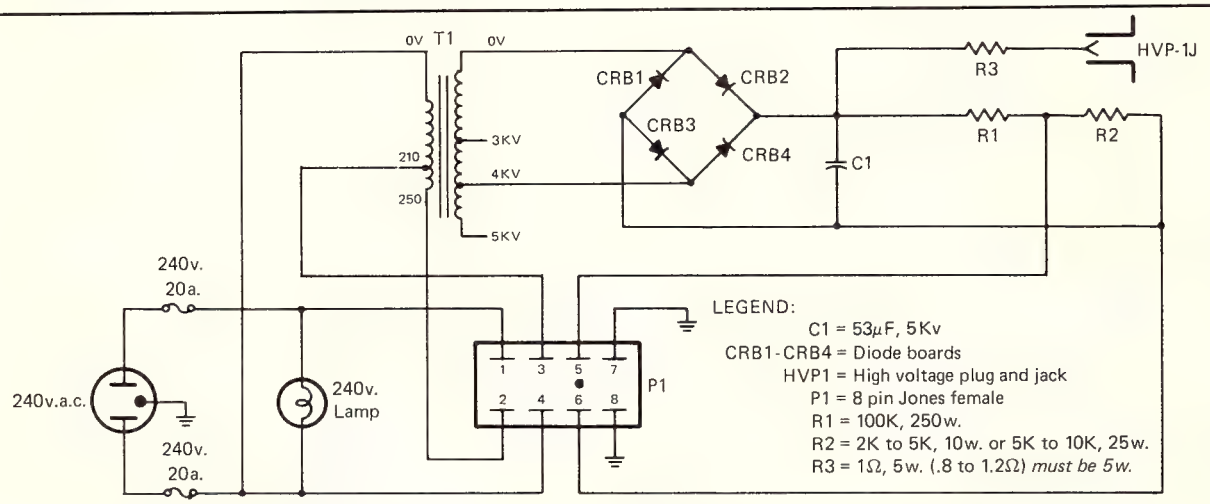
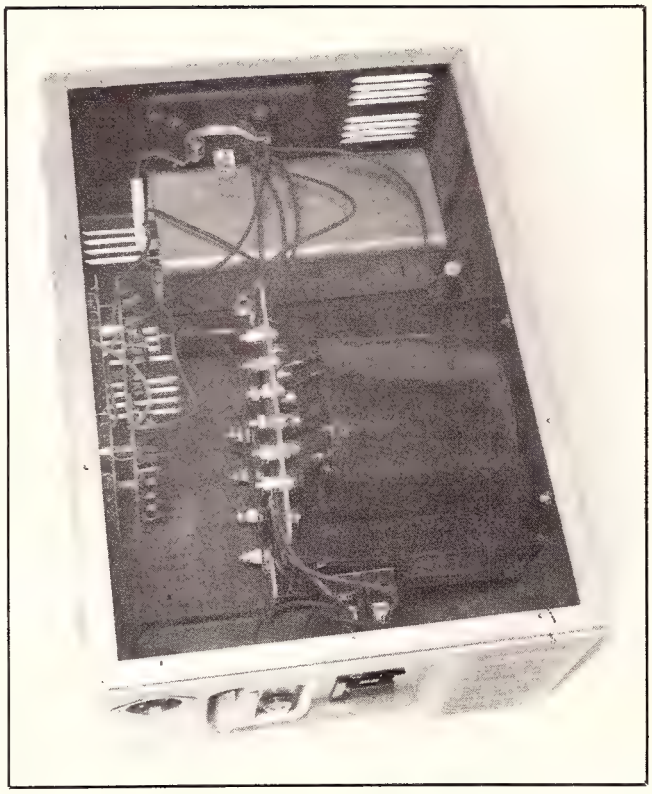


Fig. 1– Schematic diagram for the 3CX1200A7 high-voltage power supply. This same supply can be used for other amplifier projects and so was built as a separate unit.

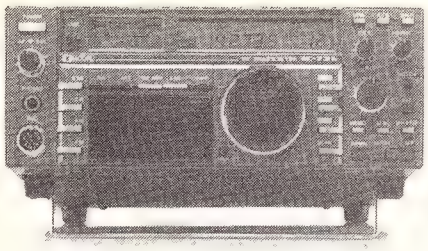
Parts List

The following parts are available from Pete W. Dahl Co. Inc.

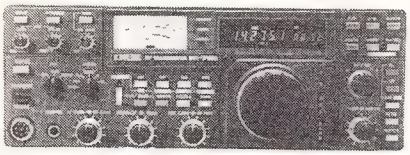
	Price
C-1: 53 uf 5 kv	$ 75.00 ea
CRBL-CRB4: 10 kv at 3 amps rectifier boards	20.00
HVP-1: Millen HV connectors (plug and jack)	5.60
HVT-1: 210 to 250 volt tapped primary 3 kv, 4 kv, 5 kv secondary, 1.8 amp Hypersil	265.00
HVT-1: 210 to 250 volt tapped primary 3 kv, 4 kv, 5 kv secondary, .9 amp Hypersil	185.00
R-1: 100K 250 watt bleeder resistor	17.50
T-1: L4B filament replacement transformer 7.5 VCT's at 21 amps	45.00



The completed power supply weighs 85 pounds. Note the collapsible handles at each end. The 20 amp, 2-pole, 250 volt breaker; neon power indicator; and 250 volt twist-lock male receptacle are visible at the lower-end handle recess. HVP-1J and P-1J are in the handle recess at the opposite end.



HF Equipment	Regular	SALE
IC-735 Xcvr/SW rcvr/mic	849.00	749.95
PS-55 Power supply	160.00	144.95
AT-120 Automatic antenna tuner	TBA	
FL-32 500 Hz CW filter	59.50	
EX-243 Electronic keyer unit	50.00	
IC-730 8-band 200w PEP xcvr w/mic	829.00	569.95
FL-30 SSB filter (passband tuning)	59.50	
FL-44A SSB filter (2nd IF)	159.00	144.95
FL-45 500 Hz CW filter	59.50	
EX-195 Marker unit	39.00	
EX-202 LDA interface; 730/2KL/AH-1	27.50	
EX-203 150 Hz CW audio filter	39.00	
EX-205 Transverter switching unit	29.00	
SM-5 8-pin electret desk microphone	39.00	
HM-10 Scanning mobile microphone	39.50	
MB-5 Mobile mount	19.50	
IC-720A 9-band xcvr/.1-30 MHz rcvr	1349.00	799.95
FL-32 500 Hz CW filter	59.50	
FL-34 5.2 kHz AM filter	49.50	
SM-5 8-pin electret desk microphone	39.00	
MB-5 Mobile mount	19.50	
IC-745 9-band xcvr w/.1-30 Mhz rcvr	999.00	779.95
PS-35 Internal power supply	160.00	144.95
EX-241 Marker unit	20.00	
EX-242 FM unit	39.00	
EX-243 Electronic keyer unit	50.00	
FL-45 500 Hz CW filter (1st IF)	59.50	
FL-54 270 Hz CW filter (1st IF)	47.50	
FL-52A 500 Hz CW filter (2nd IF)	96.50	89.95
FL-53A 250 Hz CW filter (2nd IF)	96.50	89.95
FL-44A SSB filter (2nd IF)	159.00	144.95
HM-10 Scanning mobile microphone	39.50	
SM-6 Desk microphone	39.00	
HM-12 Extra hand microphone	39.50	
MB-12 Mobile mount	19.50	



IC-751 9-band xcvr/.1-30 MHz rcvr	1399.00	1199
PS-35 Internal power supply	160.00	144.95
FL-32 500 Hz CW filter (1st IF)	59.50	
FL-63 250 Hz CW filter (1st IF)	48.50	
FL-52A 500 Hz CW filter (2nd IF)	96.50	89.95
FL-53A 250 Hz CW filter (2nd IF)	96.50	89.95
FL-33 AM filter	31.50	
FL-70 2.8 Khz wide SSB filter	46.50	
HM-12 Extra hand microphone	39.50	
SM-6 Desk microphone	39.00	
CR-64 High stability reference xtal	56.00	
RC-10 External frequency controller	35.00	
MB-18 Mobile mount	19.50	
Options: 720/730/745/751	**Regular**	**SALE**
PS-15 20A external power supply	149.00	134.95
EX-144 Adaptor for CF-1/PS-15	6.50	

ICOM

Options - continued	**Regular**	**SALE**
CF-1 Cooling fan for PS-15	45.00	
EX-310 Voice synth for 751, R-71A	39.95	
SP-3 External base station speaker	49.50	
Speaker/Phone patch - specify radio	139.00	129.95
BC-10A Memory back-up	8.50	
EX-2 Relay box with marker	34.00	
AT-100 100w 8-band automatic ant tuner	349.00	314.95
AT-500 500w 9-band automatic ant tuner	449.00	399.95
AH-1 5-band mobile antenna w/tuner	289.00	259.95
PS-30 Systems p/s w/cord, 6-pin plug	259.95	234.95
OPC Optional cord, specify 2 or 4-pin	5.50	
GC-4 World clock (Closeout!)	99.95	79.95
HF linear amplifier	**Regular**	**SALE**
IC-2KL w/ps 160-15m solid state amp	1795.00	1299
VHF/UHF base multi-modes	**Regular**	**SALE**
IC-551D 80 Watt 6m transceiver	699.00	599.95
EX-106 FM option	125.00	112.95
BC-10A Memory back-up	8.50	
SM-2 Electret desk microphone	39.00	
IC-271A 25w 2m FM/SSB/CW xcvr	699.00	569.95
AG-20 Internal preamplifier*	56.95	
IC-271H 100w 2m FM/SSB/CW xcvr	899.00	759.95
AG-25 Mast mounted preamplifier*	84.95	
IC-471A 25w 430-450 SSB/CW/FM xcvr	799.00	699.95
AG-1 Mast mounted preamplifier*	89.00	
IC-471H 75w 430-450 SSB/CW/FM xcvr	1099.00	969.95
AG-35 Mast mounted preamplifier*	84.95	

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Common accessories for 271A/H and 471A/H		
PS-25 Internal power supply for (A)	99.00	89.95
PS-35 Internal power supply for (H)	160.00	144.95
PS-15 External power supply	149.00	134.95
CF-1 Cooling fan for PS-15	45.00	
EX-144 Adaptor for PS-15/CF-1	6.50	
SM-6 Desk microphone	39.00	
EX-310 Voice sythesizer	39.95	
TS-32 CommSpec encode/decoder	59 95	
UT-15 Encoder/decoder interface	12.50	
UT-15S UT-15S w/TS-32 installed	79.95	
VHF/UHF mobile multi-modes		
IC-290H 25w 2m SSB/FM xcvr, TTP mic	549.00	479.95
IC-490A 10w 430-440 SSB/FM/CW xcvr	649.00	579.95
VHF/UHF/1.2 GHz FM	**Regular**	**SALE**
IC-27A Compact 25w 2m FM w/TTP mic	369.00	299.95
IC-27H Compact 45w 2m FM w/TTP mic	409.00	359.95
IC-37A Compact 25w 220 FM, TTP mic	449.00	299.95
IC-47A Compact 25w 440 FM, TTP mic	469.00	399.95
UT-16/EX-388 Voice synthesizer	29.95	
IC-3200A 25w 2m/440 FM w/TTP	549.00	489.95
UT-23 Voice synthesizer	29.95	
IC-120 1w 1.2 GHz FM transceiver	499.00	449.95
ML-12 10w amplifier	339.00	299.95
6m portable	**Regular**	**SALE**
IC-505 3/10w 6m port. SSB/CW xcvr	449.00	399.95
BP-10 Internal Nicad battery pack	79.50	
BP-15 AC charger	12.50	
EX-248 FM unit	49.50	
LC-10 Leather case	34.95	
SP-4 Remote speaker	24.95	

Hand-held Transceivers		
Deluxe models	**Regular**	**SALE**
IC-02AT for 2m	349.00	289.95
IC-04AT for 440 MHz	379.00	289.95
Standard models	**Regular**	**SALE**
IC-2A for 2m	239.50	189.95
IC-2AT with TTP	269.50	199.95
IC-3AT 220 MHz, TTP	299.95	239.95
IC-4AT 440 MHz, TTP	299.95	239.95

Accessories for Deluxe models	**Regular**
BP-7 425mah/13.2V Nicad Pak - use BC-35	67.50
BP-8 800mah/8.4V Nicad Pak - use BC-35	62.50
BC-35 Drop in desk charger for all batteries	69.00
BC-60 6-position gang charger, all batts	SALE 359.95
BC-16U Wall charger for BP7/BP8	10.00
LC-11 Vinyl case	17.95
LC-14 Vinyl case for Dlx using BP-7/8	17.95
LC-02AT Leather case for Dlx models w/BP-7/8	39.95
Accessories for both models	**Regular**
BP-2 425mah/7.2V Nicad Pak - use BC35	39.50
BP-3 Extra Std. 250 mah/8.4V Nicad Pak	29.50
BP-4 Alkaline battery case	12.50
BP-5 425mah/10.8V Nicad Pak - use BC35	49.50
CA-2 Telescoping 2m antenna	10.00
CA-5 5/8-wave telescoping 2m antenna	18.95
FA-2 Extra 2m flexible antenna	10.00
CP-1 Cig. lighter plug/cord for BP3 or Dlx	9.50
DC-1 DC operation pak for standard models	17.50
LC-2AT Leather case for standard models	34.95
RB-1 Vinyl waterproof radio bag	30.00
HH-SS Handheld shoulder strap	14.95
HM-9 Speaker microphone	34.50
HS10 Boom microphone/headset	19.50
HS-10SA Vox unit for HS-10 & Deluxe only	19.50
HS-10SB PTT unit for HS-10	19.50
ML-1 2m 2.3w in/10w out amplifier	SALE 79.95
SS-32M Commspec 32-tone encoder	29.95

Shortwave receiver	**Regular**	**SALE**
R-71A 100 kHz-30 Mhz digital receiver	$799.00	659.95
RC-11 Wireless remote controller	59.95	49.95
FL-32 500 Hz CW filter	59.50	
FL-63 250 Hz CW filter (1st IF)	48.50	
FL-44A SSB filter (2nd IF)	159.00	144.95
EX-257 FM unit	38 00	
EX-310 Voice synthesizer	39.95	
CR-64 High stability oscillator xtal	56.00	
SP-3 External speaker	49.50	
CK-70 (EX-299) 12V DC option	9.95	
MB-12 Mobile mount	19.50	

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put impedance will no doubt yield the anticipated 1870 single tone useful output power (Table II). However, we achieved our goal of 1500 PEP out on all bands, and we will play with impedance in a subsequent article.

Building The Power Supply

A friend and I started building the power supply at 10 a.m. and finished at 9 p.m. the same day. This included drawing the schematic (see fig. 1) and handling our normal work load, emergencies, and an employee party. We figure it took four man hours actual assembly time.

I chose a new surplus vented electronic carrying case with fold-down handles to build this power supply. Ventilation is required, since the heat generated by the bleeder resistor, rectifier, and transformer dissipation can add up. The resistor itself can dissipate up to 250 watts. The power supply, however, does run quite cool under normal use. I chose to use a 20 amp 2-pole breaker, rather than the switch and fuses shown in fig. 1. The finished supply measures 9″ × 15″ × 20″ as I assembled it, but any similar size will do. The HV transformer may be smaller if a ICCS current of .8 amp is specified, and the overall size of the supply may be reduced slightly with no ill effects to output performance. All of the power-supply components are available from Peter Dahl. The no-load HV will drop approximately 10% under full load. With the heavy-duty diode array supplied by Dahl, no extra surge protection was needed.

Stand-by cut-off bias is supplied by R2, and any close value (see fig. 1) may be used. R3 is a surge protector for the supply and will blow like a fuse if a short is encountered externally to the supply, so it **must be 5 watts and mounted, so that if it blows, the leads to it do not short out.** (After writing this article, one of the 500 pF 5 kv capacitors in the L4B shorted under a no-load voltage of only 3950 volts. R3 works!)

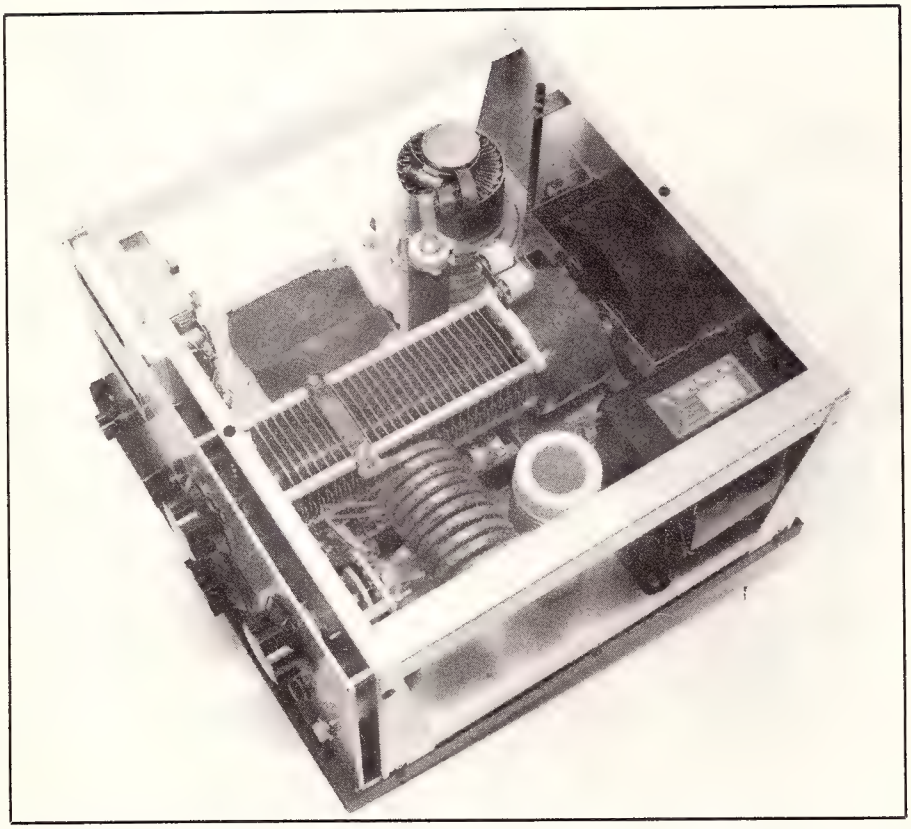
RADIO FREQUENCY LINEAR AMPLIFIER
CATHODE DRIVEN Class AB_2

TYPICAL OPERATION
(Frequencies to 30 MHz)
Class AB2 Cathode Driven, Peak Envelope or Modulation Crest Conditions

Plate Voltage	2500	300	3500	400	Vdc
Cathode Voltage[1]	0	0	0	0	Vdc
Zero-Signal Plate Current[3]	130	165	205	240	mA dc
Single-Tone Plate Current	800	800	800	800	mA dc
Two-Tone Plate Current	540	560	570	565	mA dc
Single-Tone Plate Current[3]	255	250	275	250	mA dc
Two-Tone Grid Current[3]	140	130	140	112	mA dc
Peak rf Cathode Voltage[3]	115	105	120	115	vAc
Peak Driving Power[3]	102	105	110	100	Watts
Single-Tone Useful Output Power[3]	1250	1600	1870	2055	Watts
Resonant Load Impedance	1750	2080	2430	2780	ohms
Intermodulation Distortion Products[2]					
3rd Order	-37	-35	-30	-33	dB
5th Order	-42	-47	-43	-48	dB

1 Positive cathode bias may be provided by zener diode
2 The intermodulation distortion products are referenced against one tone of a two equal tone signal
3 Approximate values.

Table II– Manufacturer specifications for the 3CX1200A7.



An interior view of the converted L4B amplifier. Note the 2 inch hose-clamp plate connector and the front tube socket hole-cover. The new filament transformer can be seen in the lower right-hand corner.

Converting The L4B

This is the simple part.

1. Replace the existing filament transformer with Dahl's new 7.5 volt 21 amp transformer, wire for wire. It mounts in the same space. **Be certain the L4B is jumpered for 230 volt operation** (see fig. 2).

2. Prepare a cover plate out of plastic,

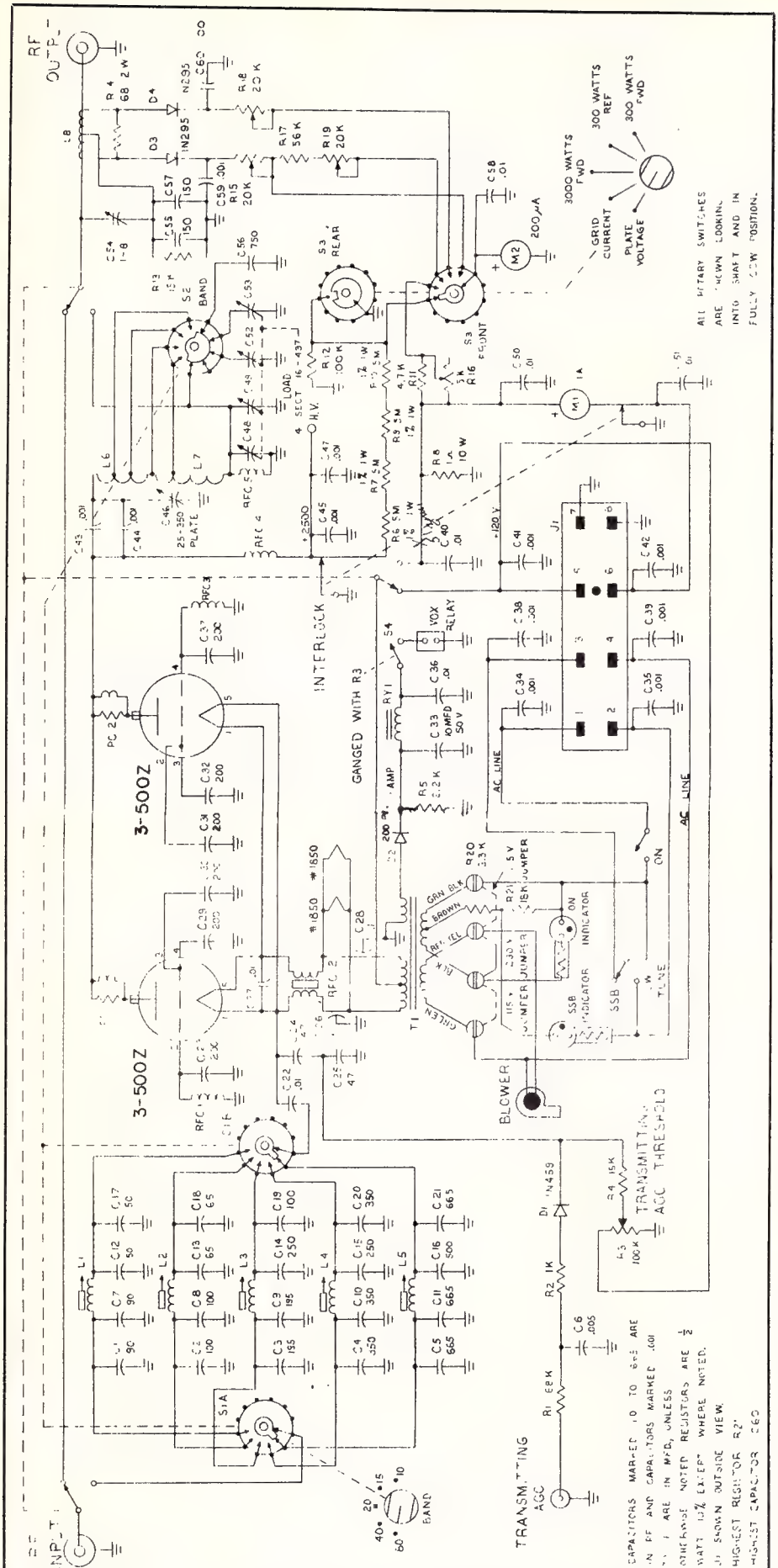


Fig. 2– Schematic diagram of the Drake L4B linear amplifier.

bakelite, or plexiglass for the front tube socket hole.

3. Remove the 3-500's if they are still there. Save the plate leads. Remove the chimney clamps on the front socket hole only!

4. Install the cover plate on the front tube socket hole using single- or double-sided tape under the cover to seal it, and bolt it in place of the front chimney clamps.

5. Install the 3CX1200A7 and its new chimney in the rear socket.

6. Install one of the two plate leads using a 2 inch hose clamp for the plate cap.

7. As you increase the output beyond the original criteria set for the L4B, the cooling fan may not be able to cool the additional heat of the tube. A bigger blower or a supplemental fan should be considered for this use. The cooler the tube runs, the longer the tube's life.

This completes the conversion. The Heath SB220 or any other amplifier using two 3-500's should be almost as simple.

Testing

Hook up the power supply with the high-voltage tap on 3 kv to start testing and assure normal operation with the **CW-SSB** switch in the **CW** position. This should give 2800 volts or so with no load. Be certain of low VSWR to avoid arcing (1.5:1 or less). Now try the **SSB** mode.

Remove the 230 volt AC source from the power supply. **Wait 20 seconds or more.** Even if a recommended shorting switch is installed, short across filter capacitor C-1 with an insulated screwdriver to be safe. Change the HV power tap to 4 kv.

Retune the amplifier in the **CW** mode (3600 volts no-load, 3200 volts loaded). If all parameters scan as normal, try the **SSB** mode (4000 volts no-load, 3500–3600 volts loaded). You should achieve outputs similar to the ones in Table I.

Footnotes

CAUTION: You are dealing with extremely high voltages which can be lethal. Use the utmost care and have a healthy respect for these voltages. High-voltage conditions may exist for 20 seconds after the primary is removed.

[1]A tube of this power capacity has a high value of inrush filament current—typically ten times the normal amount. In this case, inrush current on a cold filament is on the order of 200 amps. The Dahl filament transformer will allow this to flow for a second or two. However, this causes quite a heavy stress on the tube's filament and over a period of time is not to be recommended. It is suggested that a time-delay relay be added to the filament circuit which will short out a series resistor after a few seconds. The resistor should allow about 70% of the filament voltage to be applied during the inrush period, which is about 2 seconds. Then full voltage can be applied. This will pay off in increased tube life.

HENRY REPORT #2

New models reflect our policy by design. Technology moves fast. At Henry Radio we keep up with a steady flow of new models, some for amateur use, some for commercial use, some for industrial use and some for scientific research.

Here are three new models for this month:
*New UHF model 3004 1500 watts output at 440 MHz.
*New VHF model 3002 1500 watts output at 144 MHz.
*New HF 5K Classic, 3.5 to 30 MHz (not for sale to U.S. amateurs)

These three added to the already broad line of amplifiers we offer means that we can now cover two MHz to 500 MHz and power outputs as high as 10,000 watts depending on frequency. This may be the most complete line of power RF amplifiers available in the world.

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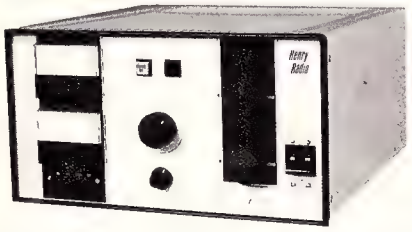
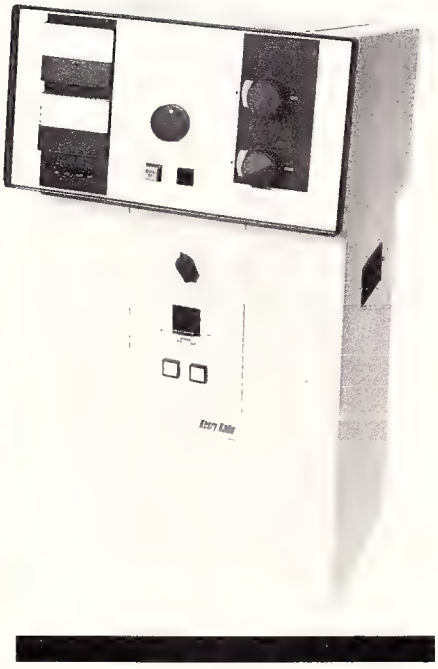
2K Classic "X"... We can't think of any way to make this magnificent 2000 watt amplifier better. Rugged...durable...the last amplifier you may ever need to buy.

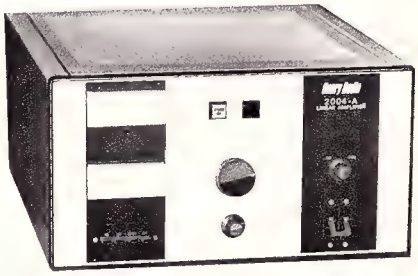
3K Classic...uses the superb Eimac 8877 tube. More than 13db gain. We believe the 3K to be the finest amateur linear available anywhere...the amplifier of every amateur's dreams.



2KD Classic...a desk model designed to operate at 2000 watts effortlessly, using two Eimac 3-500Z glass envelope triodes; a Pi-L plate circuit and a rotary silver plated tank coil. We challenge you to find a better desk model for even a thousand dollars more.



2002-A...a bright new rework of our popular 2002 2 meter amplifier. Uses the new Eimac 3CX800A7. The RF chassis uses a 1/4 wave length strip line design for extreme reliability. It provides 2000 watts input for SSB and 1000 watts input for CW. Because this tube is rated at an unheard of 15dB gain, only about 25 watts drive is required for full output.



2004-A is identical to the 2002A except that it is set up for the 430 to 450 MHz band. This amplifier uses a 1/2 wave strip line and offers all of the same specifications as the 2002A.

1002-A A rack mount 2 meter amplifier with the same design as the 2002A, except using one 8874 tube for 1/2 power specifications. Rated at 600 watts PEP output and 300 watts continuous carrier output. It employs the same strip line design as the 2002A.

1004-A...a rack mount half-power version of the 2004A. Covers the 430 to 450 MHz band using a 1/2 wave strip line design.

Henry amateur amplifiers are available from select dealers throughout the U.S. and are being exported to amateurs all over the world. In addition to our broad line of commercial FCC type accepted amplifiers we offer special RF power generators for industrial and scientific users. Call or write Ted Shannon or Mary Silva for full information.

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CQ REVIEWS: BY BOB LOCHER*, W9KNI

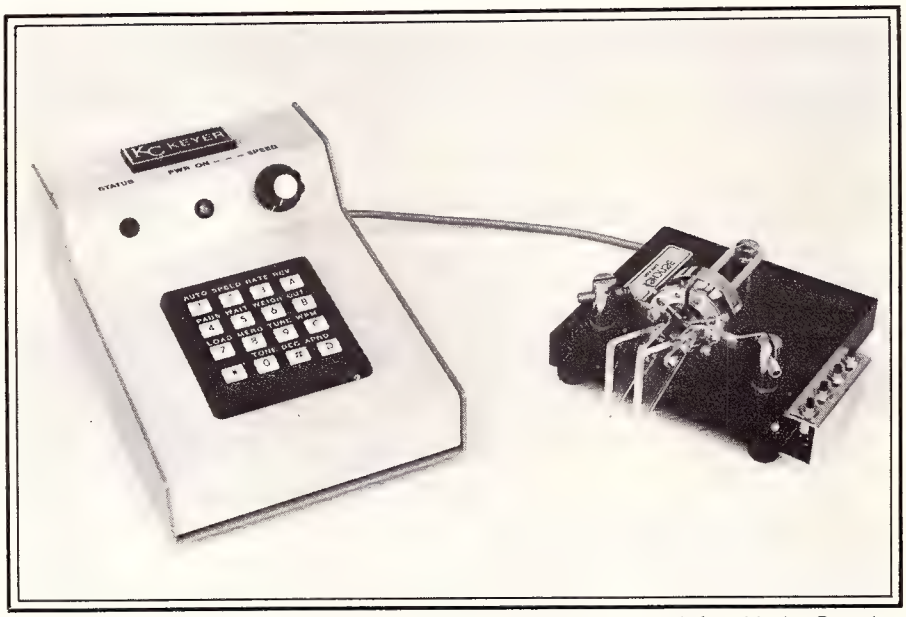
The Kansas City Keyer Model KC-1

The serious operator is always on the lookout for new equipment, methods, and technologies to gain any edge, however fine, on the competition. For many years, one important element of the successful contester's station has been a good programmable memory keyer. However, the advent of microprocessor technology in Morse code memory keyers seemed to arrive at virtually the same time that development of new features in such keyers ceased. Of course, the first generation of microprocessor memory keyers certainly brought valuable new features to the dedicated operator, especially contest operators, but other aspects left something to be desired.

Highly desirable keyer options, such as variable weighting, variable monitor tone control, switchable dot memory and dash memory, and switchable auto-spacing are all standard features of microprocessor keyers, and keyboard control of these features is acceptable to most operators. On the other hand, digital control of transmission speed is satisfactory to very few, as most operators find that they simply cannot accurately judge speed, especially in responding to another station. Most, if not all, operators prefer a variable-speed pot control.

The KC-1 Kansas City Keyer from Lance Johnson solves this problem neatly—indeed, elegantly—giving the operator a continuously variable-speed control pot, while retaining all the desirable design features of other microprocessor controlled keyers, and adding some significant new features of its own.

For a contest keyer to be useful, it must do one thing better than the competition: it must give the operator more time with his hands and mind while he is operating. Time is of the essence to the winning contest station. Time to log. Time to dupe. Time to munch on a sandwich, time to gulp a mouthful of cold coffee. Time to change log pages, time to turn the antenna. All of this time, of course, is while the station and operator continue to transmit, racking up the QSO's, with the programmed memory keyer giving the operator the time and the hands for all the above-referenced necessary chores.



The complete Kansas City Keyer package. The keyer is on the left, with the Bencher keyer and pushbutton controller on the right.

The KC-1 gives the operator more of that hands-free time, along with a host of other features designed to give the serious contester an extra edge. The features that the KC-1 offers are almost too numerous to mention. Consider, for example, the option of a programmed message that has a pause built in to allow manual insertion of information during the transmission of a memory message such as another station's call, and then, automatic resumption of the message when you are finished with the manual entry. Consider not only an automatic serial-number generator, but the ability to ask the keyer the current number without transmitting, or the ability to repeat the number or to subtract one digit from the number. Consider the ability to end a memory program with a timed pause, then have an automatic start of another message.

Not only are these features standard in the KC-1, but there are more. Imagine a totally closed loop of messages. The keyer calls "QRZ TEST DE W9KNI K," then pauses. I hear a station respond, and log the call, then key it into the waiting keyer, "ZA1AB." Perfectly timed, the memory picks up where I leave off, sending "5NN04 BK," and I log my report. To indicate confirmation after I copy his exchange, I touch the paddle, "T" and release the paddle. Again, almost magically, the KC-1 keyer senses that I am finished with the manual entry and picks up and restarts the sequence "U QRZ TEST DE W9KNI K" and keeps going. *Notice:* to achieve that QSO, I fingered, kneed, or footed NO switches. I sent two groups—one the other station's call, the other a simple "T," which the keyer followed with the "U" to finish the "TU," then automatically called up the "QRZ" routine. The rest of the time was spent logging,

*1445 Northwoods Circle, Deerfield, IL 60015

duping, drinking cold coffee . . . Hey. Wait a minute. A ZA? A ZA? Hey! That's an all-time new one!

I should be so lucky.

But that's not all! The operator can elect to program the actual wpm sending speed during a memory transmission so that messages are sent at specific speeds, or he can choose to have messages sent at whatever speed for which the keyer is set. As earlier referenced, the operator does have available a speed control knob, but the keyer also allows keyboard entered and programmed speeds. Obviously, this can be very useful. For example, you could program the "QRZ" response sequence to read "QRZ TEST DE W9KNI W9KNI AR" with the "QRZ TEST" portion of the message sent at 40 wpm, and the "DE W9KNI W9KNI AR" portion at 25 wpm. This would be exceptionally valuable in a Sweepstakes exchange.

The KC-1 even offers the ability to generate "sloppy" CQ messages, suggesting hand-sent CQ's by a tired operator, rather than the perfection of the usual programmed keyer. Such a CQ might well be desirable in the later hours of a contest in trying to snag stations not seriously dedicated to the contest. Some of these stations are reluctant to respond to a contest-machine-type CQ, but might be more likely to respond to the more comfortable "sloppy" call sent by a tired brother amateur, and give him a QSO. And some of those callers can be the extra multipliers that the competition won't snag. The "sloppy" calls are generated by purposely varying the timing between each "CQ" and by varying the number of "CQ's" in a sequence.

But, although the KC-1 is certainly a superb contest keyer, it is also a fine keyer for ordinary QSO's. Using the keyer with simple manual paddle entry, it is a friendly, easy-to-use keyer, one with which any operator should have little problem. The iambic timing of the keyer is identical to the Curtis-type "B" timing, the same as the WB4VVF designed ACCU-Keyer or the MFJ Grandmaster. The speed control pot lacks the full range of a typical keyer, but none the less covers typically a 3:1 range. However, the range of speeds can be easily changed.

When the keyer is turned on, the speed is initialized at 20 wpm at the low end of the speed range, with a high end of about 60 wpm. At any time if the operator wishes to change the speed range, he keys in the desired speed, and that speed will become the keyer speed at the point where the pot is set, with higher or lower speeds immediately available by turning the pot in the appropriate direction. So, if the operator sets the pot at mid-scale and programs the keyboard entry for 15 words per minute, he will find a speed of about 10 words per minute at the left end of the pot scale and about 30 words per minute at the high end.

Another nice aspect of the keyer is the cleverly designed optional pushbutton strip designed to fit on the side of the Bencher paddle for activation of different memory messages. Although much was made above of the ability of the keyer to run closed-loop messages, allowing strings of QSO's without use of pushbuttons, the keyer also features a total of 16 addressable memories, all callable from the keypad mounted on the front of the keyer. Four of the sixteen messages can be called by remote switching, for which the pushbutton strip is invaluable.

The KC-1 keyer is one product that will require the user to study the manual to have any hope of beginning to extract all the capabilities that this fine product offers. The manual is well written, however, and learning the full functions of the keyer is not difficult. Programming the various functions described above becomes easy, thanks to the instruction manual walking the new user through the various sequences, and clever contesters will undoubtedly discover additional tricks that the flexibility of the KC-1 will allow.

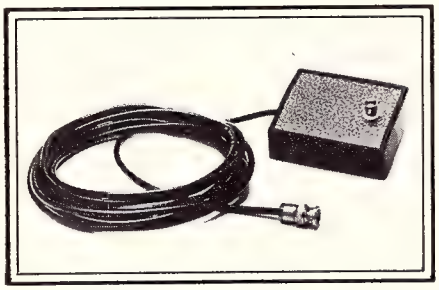
The KC-1 includes enough memory for about 1500 characters, battery back-up protected in case of power failure. It is housed in an attractive slope paneled cabinet, designed to make its use under fire as simple as possible. It includes dual-polarity keying, and a standard wall-plug power supply. The unit is covered by a 90-day warranty.

Although the KC-1 offers a complex level of capabilities, it is also a fine, easily used, friendly keyer for casual operating in between contests. Although its capabilities and price put it into a class where it is not for everyone, any amateur seriously interested in contests must give it careful consideration.

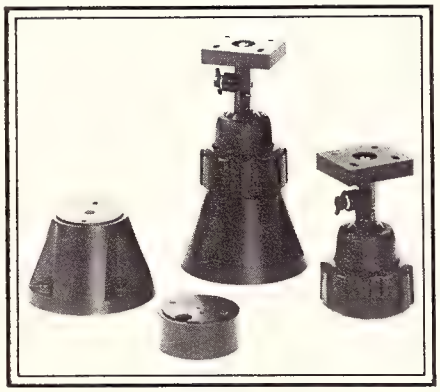
The KC-1 Keyer is available from Lance Johnson Engineering, P.O. Box 7363, Kansas City, Missouri 64116. The price of the basic keyer is $199.95. The optional pushbutton strip sells for $19.95.

CQ SHOWCASE

Larsen Magnetic Mount and Mobile Telephone Mount



Larsen Electronic's new magnetic mount unit, with BNC connectors at both ends, allows portable radio operators to remote the portable's normal antenna outside the vehicle for mobile operation. The mount comes with 12 feet of cable for use on any vehicle. The magnetic mount contains heavy magnets and has a protective Teflon base.

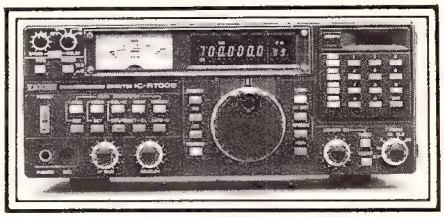


Larsen's new Command Post Mobile Telephone Mount offers a variety of mounting options—dashboard, console and floor—with a central post that pivots 360 degrees on a ball joint and locks in position. A joint in the middle tilts up or down, allowing any position or angle. The mount is adjustable from inside the vehicle. The Command Post system is designed to reduce vibration to the phone unit while providing a wide range of non-slip adjustments. The basic mount may be ordered alone or with any combination of mounting accessories for individual needs.

For information on both these products, contact Larsen Electronics, P.O. Box 1799, Vancouver, WA 98668, or circle number 101 on the reader service card.

The ICOM IC-R7000 Receiver

For monitoring all amateur radio frequencies, ICOM has introduced the IC-R7000 25–2000 MHz (specifications guaranteed from 25–1300 MHz) continous-coverage receiver. The IC-R7000 also covers aircraft, marine, government, emergency services, and television bands. The IC-R7000 features 99 memory channels, direct keyboard frequency access or main tuning knob access, FM/AM/SSB modes, scanning (memory, mode, and programmable or priority), adjustable scanning speed, narrow/wide filter selection, five tuning speeds (0.1, 1.0, 5, 10, 12.5, or 25 kHz), fluorescent display with dimmer switch, noise blanker, and more.



The IC-R7000 is 4⅜″H × 11¼″W × 10⅞″D. Also available are an optional RC-12 infrared remote controller, and optional voice synthesizer. The units sells for $899. For more information, contact ICOM America, Inc., 2380 116th Ave., N.E., Bellevue, WA 98004, or circle number 102 on the reader service card.

Wattmeters and VSWR Bridges Available From Encomm

Welz Corporation and their American distributor Encomm, Inc. have announced the introduction of a series of wattmeters and VSWR bridges. Some models peak and average power, while the mobile units also measure the automobile operating voltage. For more information on the line of wattmeters and VSWR bridges, contact Encomm, Inc., 2000 Ave. 'G' Suite 800, Plano, TX 75074, or circle number 103 on the reader service card.

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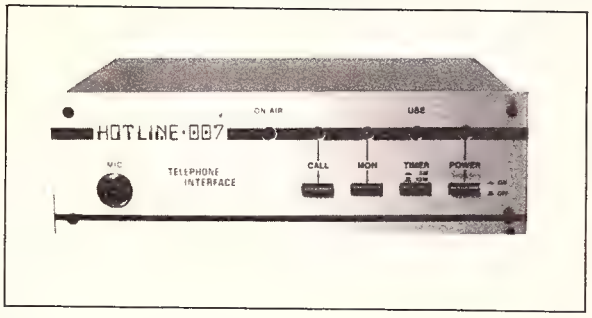
Automatic Vox Phone Patch System



OPTIONAL:

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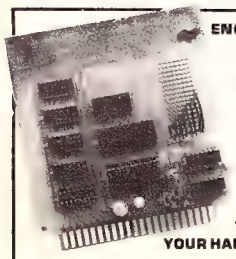
CIRCLE 57 ON READER SERVICE CARD



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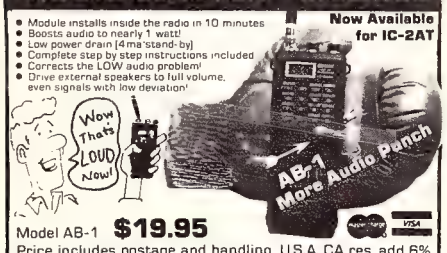

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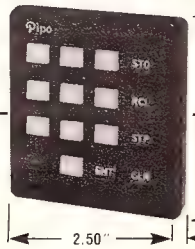

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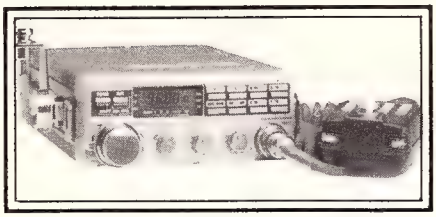
Radio Amateur Callbook Publications

Radio Amateur Callbook is presenting three new publications for 1986. The *North American Callbook,* the *International Callbook,* and the *Callbook Supplement* will provide current QSL information for over 880,000 radio amateurs throughout the world. Published on December 1, 1985, the new *1986 North American Callbook* lists the licensed amateurs in all countries in North America plus those in Hawaii and U.S. possessions. Also featured are international postal information, world-wide QSL bureaus, census of radio amateurs around the world, and more. Also published on December 1st, the *International Callbook* lists the calls, names, and address information for licensed amateurs in all countries outside North America. All the traditional *Callbook* "extras" are included. The *1986 Callbook Supplement* is a new concept in *Callbook* updates. To be published June 1, 1986, the new supplement will list the combined activity in both the *North American Callbook* and the *International Callbook* for the preceding 6 months. One supplement will give new licenses, address changes, and "then and now" call changes from countries around the world.

For more information, contact Radio Amateur Callbook, Inc., 925 Sherwood Drive, Box 247, Lake Bluff, IL 60044, or circle number 104 on the reader service card.



Kenwood TR-50 Transceiver

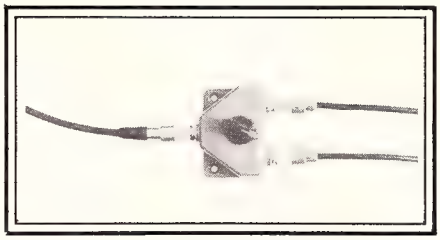
The Kenwood TR-50 is a battery-pack mobile/portable 1200 MHz FM transceiver that covers from 1260–1300 MHz with a 1 watt output transmitter, repeater offset with reverse switch, five memory channels, programmable scanning, memory scan, a priority alert function, and RIT. "Odd splits" operation is possible using memory channel five. The multi-function LCD panel indicates frequency, VFO A/B, repeater offset, S/RF/battery condition, and other keyboard functions.

The TR-50 comes complete with a rechargeable battery set and charger, shoulder strap, 16-key DTMF hand microphone, and an antenna on an adjustable mount. An external power cable is also included for mobile or base station supply operation. For more information, contact Trio-Kenwood Communications, 1111 West Walnut St., Compton, CA 90220, or circle number 106 on the reader service card.

MFJ-1702 Two-Position Coaxial Switch

MFJ Enterprises, Inc. has introduced its two-position coaxial switch, the MFJ-1702. This switch has one pole, two output positions, and low insertion loss (less than 0.2 dB). Its maximum frequency range is 500 MHz, and it has less than 20 milliohms contact resistance SO-239 connectors. It has a VSWR of 1:1.2 and gets better than 60 dB isolation at 300 MHz and better than 50 dB at 450 MHz. The power rating is 2.5 kw PEP, 1 kw CW. Unused terminals are also automatically grounded for static/lightning/RF protection.

MFJ includes a one-year unconditional guarantee, and an additional 30-day money-back guarantee if the product is purchased directly from MFJ Enterprises, Inc. Cost of the MFJ-1702 is $19.95 (plus $5.00 shipping and handling). For more information, contact MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762, or circle number 107 on the reader service card.



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Character codes: CBM ASCII code.
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CQ World-Wide DX Contest All-Time Phone Records

BY FREDERICK CAPOSSELA, K6SSS

In the records listed below, boldface listings denote world records. Number groups after calls are: year of operation, total score, contacts, zones, and countries. All-band and Multi-Operator records include a band-by-band breakdown of the world leader in each category.

Single Operator/Single Band
WORLD RECORD HOLDERS

1.8	UP2BBT/U6V('83) . . . 203,416	1,490	8	39
3.5	YV3AZC('84) 351,324	1,238	26	82
7.0	EA8AK('84) 776,700	1,736	35	115
14	VP2KAA('81) 2,011,185	4,186	37	150
21	AH0AB('82) . . . . . 1,923,840 (Opr. JA3DOC)	4,509	36	108
28	YV2AMM('82) 1,839,004	3,700	37	130

AFRICA

1.8	EA8AK('82) 34,220	201	12	46
3.5	CT3BZ('79) 235,113	772	22	87
7.0	EA8AK('84) 776,700	1,736	35	115
14	CR6WW('74) 1,058,446	2,152	35	132
21	EL2AV('81) 1,404,936	3,087	35	117
28	OH2MM/CT3('79) . . 1,827,150	4,068	37	113

ASIA

1.8	UP2BBT/U6V('83) . . . 203,416	1,490	8	39
3.5	UW9AF('83) 222,192	554	19	53
7.0	4Z4DX('81) 241,368	721	26	87
14	N2BZQ/4X('82) 1,142,964	2,347	36	135
21	4S7AAG('81) . . . . . 918,925 (Opr. OH2BCP)	2,897	38	137
28	4X0U('80) . . . . . 1,187,200 (Opr. 4X4UH)	2,555	37	123

EUROPE

1.8	LZ2CJ('84) 107,818	1,319	13	61
3.5	YT3A('82) . . . . . 154,972 (Opr. YU3DM)	806	28	84
7.0	IO3MAU('83) 355,000	1,447	31	94
14	I5NPH('80) 1,062,936	2,429	37	134
21	LZ2KTS('83) . . . . . 1,368,897 (Opr. LZ2CC)	2,821	39	152
28	9H1EL('81) 1,355,760	3,662	36	132

NORTH AMERICA

1.8	KV4FZ('76) 37,584	380	11	37
3.5	NE4G/6Y5('84) 278,520	1,221	27	83
7.0	XN3BMV('84) 546,615	1,882	31	104
14	VP2KAA('81) 2,011,185	4,186	37	150
21	VP2KAC('81) 1,783,500	3,941	37	137
28	KV4FZ('79) 1,482,525	4,079	39	126

OCEANIA

1.8	VK6HD('83) 5,363	62	11	20
3.5	KH6XX('82) 161,622	773	27	46
7.0	T32AF('84) . . . . . 677,844 (Opr. KH6UR)	2,045	34	80
14	ZM1BIL('83) 1,334,232	2,635	38	136
21	AH0AB('82) . . . . . 1,923,840 (Opr. JA3DOC)	4,509	36	108
28	AH0B'(82) . . . . . 1,788,430 (Opr. JA2VUP)	4,173	36	109

SOUTH AMERICA

1.8	YV2IF('84) 18,291	172	14	25
3.5	YV3AZC('84) 351,324	1,238	26	82
7.0	9Y4VU('84) 700,488	1,718	28	110
14	FY7AK('76) . . . . . 1,415,329 (Opr. F5QQ)	2,950	36	127
21	CX4CR('82) 1,602,120	3,519	36	120
28	YV2AMM('82) 1,839,004	3,700	37	130

Single Operator/All Band

AF	EA8AK('81) 9,974,811	5,506	152	457
AS	EX6F('84) 6,362,000	4,648	113	387
EU	YU3EY('82) 4,913,574	3,170	136	455
NA	HI8PGG('81) . . . . . 9,009,721 (Opr. N1GL)	7,190	131	392
O	KH6XX('81) 5,713,434	4,912	131	262
SA	9Y4VT('82) . . . . . 11,954,696 (Opr. N6AA)	7,082	146	422
QRP	TG9GI('82) 1,035,693	1,747	75	192

Multi-Operator/Single Xmtr.

AF	ED9CM('83) 10,157,160	5,148	152	511
AS	RG6G('82) 12,276,352	6,012	156	558
EU	I4RYC('80) 9,918,368	5,997	139	453
NA	NP4A('82) 14,953,818	8,772	174	585
O	KC6ZR('80) 7,605,360	6,197	137	283
SA	9Y4W('82) 16,775,034	8,097	158	540

Multi-Operator/Multi-Xmtr.

AF	EA8CR('77) 21,351,898	10,290	153	544
AS	EW6V('82) 18,746,136	10,100	142	544
EU	OH0W('82) 19,030,501	10,773	188	729
NA	VP2KC('79) 37,770,012	17,767	175	677
O	KH6XX('79) 21,990,252	10,989	184	494
SA	P41C('81) 41,957,244	17,718	173	625

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	39	7	9
9Y4VT	3.5	404	17	57
(1982)	7.0	748	25	78
11,954,696	14.0	1,620	32	89
	21.0	1,476	34	96
	28.0	2,795	31	93
	Total	7,082	146	422

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	124	8	25
9Y4W	3.5	296	17	59
(1982)	7.0	594	27	86
16,775,034	14.0	1,953	35	127
	21.0	2,104	35	121
	28.0	3,026	36	122
	Total	8,097	158	540

WORLD RECORD

Station	Band	Contacts	Zones	Countries
	1.8	261	9	21
P41C	3.5	861	22	69
(1981)	7.0	1,752	30	98
41,957,244	14.0	4,837	38	156
	21.0	5,790	39	143
	28.0	4,813	35	138
	Total	17,718	173	625

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THEODORE J. COHEN, N4XX

THE INS AND OUTS OF THE WASHINGTON SCENE

Amateur Operators Participate in Emergency Communications Test

The National Communications System (NCS) has released the results of its latest Emergency Communications Test involving volunteer communications systems. Conducted on 21 and 23 March 1985. and dubbed *Night Tango IX,* the exercise was intended to evaluate the ability of volunteer operators in the Amateur service, in the Military Affiliate Radio System (MARS; Air Force, Army, and Navy/Marine Corps), and the Civil Air Patrol (CAP) to provide critical communications resources during a national emergency.

During the test four NCS representatives prepared messages from simulated senior government officials, and used the five volunteer radio systems to pass these messages. Of interest to the NCS were things such as message timeliness, message accuracy, NCS/Volunteer interfaces, and system reliability. In all, each NCS representative sent the other three representatives a message on each of the two exercise days; thus, a total of 24 messages were to be sent through the volunteer system. Because all locations did not have participating volunteers, however, only 84 transmissions of the 24 messages were attempted. Of these, 77 were received, for a total transmission reception rate of 92%. Army MARS scored the lowest in this area, with only 60% of the transmitted messages received, while amateurs received 90% of the messages. Air Force MARS and the CAP received all of the messages.

According to the NCS report, the average receipt time for the 77 transmissions was 1 hour and 45 minutes. The average time for messages sent through amateur volunteers was over two hours, but was not as bad as that observed for Air Force MARS (over three hours). The CAP and Navy/Marine Corps MARS had the best showing, with average receipt times of under one hour.

While it is tempting to compare the results obtained for this exercise with the results of other *Night Tango* exercises, the data for each exercise must be used with caution. The number of variables in each exercise, including propagation effects and the availability of operators, can make it difficult to draw meaningful comparisons. Regardless, the report stated that all participating volunteers displayed a high degree of enthusiasm and that the operating procedures used in the volunteer systems continue to improve. The latter is particularly important, concluded the NCS, since such improvements will further enhance the ability of these systems to support national security and emergency preparedness requirements.

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FCC Seeks League Assistance On Gauging Problems With Anti-Pilferage Devices

According to Jeffrey Young, Enforcement Division, Field Operations Bureau, FCC, the Commission recently asked the League's Amateur Auxiliary (i.e., the Official Observers) to assist in the collection of data on so-called "anti-pilferage devices." These low-power communication devices currently operate on 2, 4.5, and 8.2 MHz, and are used in retail stores across the country to catch shoplifters. Under General Docket 85-129, however, the Commission proposes to permit these devices to be used on any frequency between 1.6 and 10 MHz, with signal levels of up to 100 μV/m at 30 m. As such, the potential for interference to amateur receivers is one of the issues being investigated.

In calling upon the Amateur Auxiliary, the FCC's intent was to identify amateurs living near anti-pilferage devices, and to obtain answers to the following four questions:

1. Approximate distance to the low-power transmitter?
2. Signal strength (or signal-to-noise) reading for the received signal?
3. Gain of the receiving antenna at 2, 4.5, or 8.2 MHz?
4. How objectionable would the signals be if they were found in an amateur band?

Data from the Amateur Auxiliary were to have been in the Commission's hands by the end of August, though the cutoff date may have extended to ensure that sufficient data were available for analysis.

At this time, no studies have been made on the interference anti-pilferage systems might experience as a result of amateur transmissions. Regardless, the League, in its comments on the docket, requested that the anti-pilferage devices be prohibited from operating in the 160, 80, and 40 meter amateur bands, and that use of these devices be restricted to commercial, business, or industrial environments.

The "Paper Tiger" Has Teeth

In this era of "unregulation," the Commission has often been referred to as a "paper tiger." But according to Richard Smith, Chief, Field Operations Bureau (FOB), FCC, amateurs and manufacturers alike are finding out that the so-called "paper tiger" has sharp teeth.

One example of the Commission's continued enforcement efforts is the recent seizure of $1 million in computer inventory that had been scheduled to be sold by auction at the Seequa Computer Corporation in Odenton, MD. The seizure capped a ten-month investigation into the marketing by Seequa of systems that did not meet FCC regulations for incidental radiation. Seequa was first issued a citation in October 1984 for marketing its Chameleon model without having followed FCC certification rules, said Richard Engelman, Chief, Investigations and Inspections Branch, Enforcement Division, FOB. And while the company did eventually receive a Grant of Equipment Authorization from the FCC, the models seized did not comply with the requirements of that grant.

A search warrant allowing the seizure of the equipment was issued as the result of a request through the U.S. Attorney's office in Baltimore. Personnel from the FCC Baltimore District Office, the FCC Laboratory, and the FCC's FOB headquarters partipated in the search and seizure.

Engelman Named To FOB Post

Richard B. Engelman has been named Chief, Investigations and Inspections

(I&I) Branch, Enforcement Division, FOB, FCC. Engelman, who received his B.S.E.E. from the Rose-Hulman Institute of Technology in Terre Haute, IN, joined the Commission in 1977, and participated extensively in regulatory matters pertaining to national and international broadcasting. Prior to his being named Chief of the I&I Branch, he was assigned to the FOB's Engineering Division, where he conducted technical studies that were used to determine the type of equipment needed by the Bureau's field activities to adequately enforce the Commission's rules and regulations.

Engelman holds an Amateur Extra class license as well as a private pilots license, and he lives in Alexandria, VA.

AMRAD Assists Hearing Impaired In Using Computers

You would think that the availability of inexpensive home computers would be a boon to the hearing impaired. But it just isn't so! The reason is that a large installed base of telecommunications devices for the deaf (TDDs) already exists, and these devices use Baudot code. Computers, on the other hand, communicate using ASCII. Thus, those who switched from TDDs to computers risked being cut off from the majority of hearing-impaired persons who "talked with their fingers."

All that is changing, however, and one of the organizations responsible for the change is the Amateur Radio Research and Development Corporation (AMRAD). According to the "AMRAD Newsletter," members of the corporation, under a federal grant, have adapted several popular home computers to function as TDDs. In each case, the software and design data were made available to the public. Additionally, AMRAD has programmed one of the world's first "bilingual" bulletin boards. Known as HEX, for Handicapped Educational Exchange, the bulletin board accepts calls from either TDDs or computers. The corporation's bulletin board is now in its second generation of development, and serves as a clearing house for information on the use of computers to aid the disabled.

For more information on HEX and on AMRAD's activities in the area of TDD/computer compatibility, contact Richard Barth, W3HWN, c/o AMRAD, P.O. Drawer 6148, McLean, VA 22106-6148.

NABER Creates Professional Organization For Radio Technicians

The National Association of Business and Educational Radio (NABER) has announced the establishment of the Association of Communications Technicians (ACT). A section of NABER, ACT has been developed to provide services that are specifically tailored to today's technician. Through ACT, technicians will be kept informed about technical information important to their profession and will receive the direct benefits of membership designed to assist them in doing their job and advancing their careers.

The new association will have two levels of membership, general and senior. All communications technicians are eligible for general membership, while only NABER-certified technicians are eligible for senior membership. General members will receive, among other things, a year's subscription to *Business Radio;* a new quarterly technical newsletter, "TechTalk"; and discounts on various publications. Senior members of ACT receive all of the general member benefits plus life insurance, discounts on other forms of insurance, and other benefits.

For more information, write to NABER-ACT, P.O. Box 19164, Washington, DC 20036, or call the NABER Technician Services Office at (202) 833-3956.

Cable TV Interests Continue To Push for Scrambling; Home Satellite Terminal Users Push for "Viewers' Rights"

In what could soon become a head-to-head confrontation before the U.S. Congress, cable television (CATV) interests are pushing the satellite transmission companies to scramble their signals at the same time that viewers are defending their "rights" to receive such signals. According to "CATACABLE," a monthly newsletter of the Cable Television Association, the marketing of small earth terminals for home use has shifted from rural markets to cable markets, where the main sales pitch is that you can "get something for free" by buying a home earth terminal instead of paying the cable operator. The association apparently had no problem with the use of home earth terminals in rural markets, where the availability of television signals was limited, but finds the use of these terminals in areas served by its member operators a threat to the continued viability of their CATV systems. Scrambling, says Association President Carl Schmauder, would secure the signals, and would ensure that those who benefit from the services pay for them.

Meanwhile, a move is underway in the House of Representatives to block pay-television programmers from encoding their satellite signals. This ban would be imposed until such time that prices, terms, and conditions are established for marketing satellite signals to those with home earth terminals. According to *The Westlink Report,* however, pay programmers (such as HBO and Showtime) may be making contingency plans to terminate their satellite operators, and to switch instead to terrestrial microwave systems for signal distribution.

Further to the matter of marketing satellite signals, HBO has announced prices for direct home reception of its HBO and Cinemax satellite services ($12.95 per month for each service, or $19.95 per month for both), with the initial price of home decoders quoted at $399. According to "CATACABLE," this has already resulted in a significant slowdown in home earth terminal sales.

Suffice it to say that the last chapter in the use of home earth terminals is yet to be written. Stay tuned for details.

Your Washington Editor thanks Steve Thompson, N4TX, for his contributions to this month's column.

1985 CQ WW WPX CW Contest High-Claimed Scores

The following scores are early-bird high-claimed scores as of 28 July 1985. These are raw scores subject to verification.

U.S.A.
SINGLE OPERATOR
ALL BAND

KT3Y	3,161,018
KC1F	3,143,868
KQ2M	3,002,510
K1GQ	2,767,273
KI6P	2,684,710
K3ZO	2,406,624
NR5M	2,340,849
W3GM	1,809,900
K1XA	1,548,960
K5RX	1,482,984
K4JPD	1,452,816
K1VUT	1,403,116
KM9L	1,358,048
N6ICV	1,140,300
AJ6V	985,520
K7LXC	925,290
WA2OOS	887,698
WA6AUE	795,872
KMØL	753,753
N4KMY	8,592

28 MHz

KE5CV	5,566
NU4Y	5,467
W8AKS/6	288

21 MHz

KA5W	64,750
KS9J	11,616
NØBSH	8,094

14 MHz

N2AA	1,658,469
K2TW	1,324,430
AI7B	1,247,290
N1CQ	1,089,900
W5WMU	1,037,993
W5FO	854,104
N3BJ	852,202

7 MHz

N5RZ	1,754,664
KR2Q	1,555,910
K1MM	1,397,400
KZ2S	1,179,288
NI6W	1,043,526
KM3T/2	911,820
AA6XX	451,200

3.5 MHz

N2AU	120,990
NE6I	52,628
KJ9D	27,178
WB6JMS	25,020
K3TW	19,680
NV6O/2	2,236

1.8 MHz

K5UR	13,668
KA1SR	884

MULTI-OPERATOR
SINGLE TRANSMITTER

NA5R	3,919,662
AI6V	2,781,341
WC4E	2,510,224
N7TT	3,357,161
KU2C	2,172,942
AK6A	1,891,998
NU6S	1,740,409
NI8V	1,710,308
WC6I	1,472,472
AK6T	1,010,322

MULTI-OPERATOR
MULTI-TRANSMITTER

NM5M	4,325,412
K6XO	504,144

QRP/p

KA2AEV	A	232,349
W8VSK	A	162,150
KB7G	14	54,284
AA2U	7	57,814

DX
SINGLE OPERATOR
ALL BAND

YZ4GD	3,870,272
5Z4MX	2,922,318
OK1RI	2,660,690
DF9ZP	2,014,956
IK2DVG	2,014,880
6Y6A	1,756,800
VE3CRG	1,638,226
KG6DX	1,562,160
CE3DNP	1,492,705
OH6LI	1,423,800
AH6AZ	1,279,047
HB9CSA	1,159,640
OH2PM	1,107,447
JH1OGC	1,096,077
JE6MQW	910,316
VK2APK	902,598
OK3ZMV	888,336
VE3DZV	817,544
EG7TH	740,885
HP1XKR	704,245

28 MHz

YO3KWJ	96,882
4M7QP	15,972
OH2EJ	12,610
SMØCOP	10,191
SM5DUT	8,988

21 MHz

YT3L	515,619
G4CNY	343,226
JA1ZLO	107,334
EI1DP	80,029
JWØEQ	63,525

14 MHz

YX5A	3,042,480
JAØDAI	1,109,745
VE6CB	1,035,386
OH3KM	807,311
YU7BJ	714,560
JH1AEP	709,198

7 MHz

YZ9A	1,920,960
T32AF	1,255,918
OH2BH	1,253,600
OH6EI	1,122,590
YT3T	971,520
JA5BJC	736,764
DK2OY	600,320

3.5 MHz

I4IND	526,812
YU1ZZ	341,205
VE3BMV	313,838
CF7SK	226,080
VE1AIH	92,964
OH2BCI/OHØ	77,616

1.8 MHz

LA7JO	25,748
VE3MFA	23,302
VE3INQ	22,272
VE3OME	19,872
PA3BFM	6,192

MULTI-OPERATOR
SINGLE TRANSMITTER

HH2WW	5,062,500
GB2MM	3,562,503
IO3FIY	2,942,294
JA3YBF	2,607,084
OH1AF	2,507,490
OG3AA	2,459,200
IO2UIY	2,445,232
JE2YRD	2,161,072
7S7SSA	2,031,928
8J7ITU	1,600,902

MULTI-OPERATOR
MULTI-TRANSMITTER

KH6XX	8,564,616
KL7Y	6,486,053

QRP/p

YU7RU	A	236,106
4X6IF	A	233,636
4X6NM	21	89,080
OK8ACW	14	52,640
YO4DCF	7	23,184
SP9GKM	3.5	17,956

NOTE: Queries pertaining to the WPX Contest should be sent to N8BJQ via CQ Magazine, 76 N. Broadway, Hicksville, NY 11801.

Ticket Talk

a monthly feature by
FREDERICK O. MAIA, W5YI

INFO ON AMATEUR RADIO LICENSING

The Test Session

The hardest decision that volunteer examiners make is deciding to hold their very first amateur radio operator examination session. While it is true that there is a big difference between assisting at a test and being the Contact VE, it really is quite a simple process. The mechanics are pretty much the same no matter with which VEC a volunteer examiner is accredited. Here are the steps.

Lining Up the VE's

You must have a minimum of three *accredited* volunteer examiners to hold an examination session. Our VEC program only accredits Extra class amateurs. Some VEC programs accredit Advanced class amateurs to administer certain lower class examinations. At this writing, the FCC only allows Extra class amateurs to administer *any* of the Morse code examinations above the Novice level.

Many VE's set up an organized testing group complete with a team name. Since we divide "expense recoupment" (test fees) with our volunteer examiners, many of our VE teams establish bank accounts in the name of their test team to make handling of the funds easier.

We recommend a minimum of four VE's (and preferably more) on a testing team to provide at least one alternate in the event of emergencies, sickness, or other unforeseen events that might preclude a VE from being in attendance. You also should consider the use of "assistants" to help during the session. These assistants or "helpers" need not be accredited VE's and can hold any class license. There is certainly plenty to do if anyone wants to get involved in amateur radio operator testing.

VE's from other VEC programs are eligible to participate in a test session, but they must be approved by the VEC coordinating the examination. This usually only involves sending a signed statement or application along with a copy of the VE's amateur radio operator license.

It is contrary to FCC rules to use VE's from other VEC programs without prior VEC accreditation. Allow time—at least two *additional* weeks—before your scheduled test session to get more VE's accredited, since this is a separate process.

P.O. Box 10101, Dallas, TX 75207

Scheduling the Session

Once you have the required number of volunteer examiners, the next step is to determine when and where you want to hold the examinations. Most of the examinations that we coordinate seem to be held in public locations, such as a meeting room in a municipal, school, or industry facility. To the best of our knowledge, no one has paid for a testing locations thus far. Many testing sessions are also held in conjunction with hamfests, club meetings, and amateur radio operator training classes.

You will also want to make a decision on whether you want to schedule just one test session or hold examinations on a repetitive basis. Cities with populations exceeding 100,000 ideally should have monthly exams available. Quarterly examinations in smaller cities should be adequate.

One of the advantages of the new volunteer program is that tests are now usually administered during the evening or weekends. The FCC, of course, gave them during regular business hours. Contrary to what you may have heard, there really is *not* a shortage of amateur exams—only VE's to come forward and administer them. The good news is that at this point it appears that volunteers will administer *double* the number of amateur tests in 1985 as the FCC did in 1984, their last year of testing!

A word about holding upgrade tests at amateur gatherings. The only fee you charge an applicant is the *one* test fee, usually $4.00 and *no more*! The amount of the test fee is determined by the VEC. A test candidate cannot be required to pay an additional admission charge to the amateur gathering, nor can an applicant be charged more than one test fee regardless of the number of examinations administered. An applicant who upgrades at a hamfest from Novice to Extra class pays only one fee and *cannot* be required to pay the admission charge to the hamfest.

It is also required that the VE team make a public announcement of the upcoming amateur examinations. This can be in any form, including a club newsletter release, announcement on a local repeater, and even a posted notice at the local amateur radio equipment supplier.

Once you have determined the test site and date, then you must decide whether you want to require applicants to submit their applications (FCC Form 610) in advance or at the test session. Be aware that some VEC's require advance registration, or no walk-ins. As a general rule, we advocate paying the test fee at the examination session and allowing walk-in candidates. Some VEC's require that the test-fee check be made out to them. Since we split these fees with our VE's, we recommend that the fees be made payable to the testing team, who in turn reissues a check to us for the VEC share.

Retaking Failed Examinations

The FCC still has a rule, at this writing, that requires a 30-day wait before retaking a failed examination. The FCC has, however, empowered VEC's to grant waivers of this rule for *any* good reason. Such a reason might be that it has been only 27 days since the last examination session in a candidate's area. A letter from the applicant requesting a waiver of the "30 day rule" must be attached to the application and sent to the VEC. This letter must explain the reason for requesting the waiver. Granting of the waiver is at the discretion of the VEC. If approved, the "request for waiver letter" will eventually be forwarded to the FCC's licensing facility in Gettysburg along with the applicant's application.

VEC Advised of the Test Session

It is now time to write and advise the VEC that you need test session instructions and materials. The VEC will want to know when you have scheduled the test session and certain other information. We require notification *only* of the date and city and state in which the examination will be held, plus the name, address, and telephone number of the "contact" VE with whom we will be working. Allow the VEC time to get you the needed test materials. We recommend 30 days advance notice, although we can act on less if need be. While we can even handle test notifications by telephone, we prefer that it be done in writing.

The Contact VE whom we deal with is the volunteer examiner who operates as liaison between the testing team and the VEC. Other VEC organizations may require additional information such as the names of the accredited VEs, the exact test location, session sponsors, various test parameters, and on and on. We try to

keep it as simple and streamlined as possible. Some VECs don't. If we can get along without additional pieces of paper, we do.

VEC Acts on VE Request

The VEC will forward the Contact VE the needed session forms and tests. Different VEC's have different systems for handling this. Our system is to simply forward what we call a preassembled "session packet" to the Contact VE. This packet contains three different copies of each test to be administered, plus the needed forms (there are only two) and an instruction booklet. This booklet is only 16 typewritten pages long and is updated about once every 60 days to conform to recent changes in the VEC program and FCC rules. It tells the VE team everything they have to know to conduct the session.

Additional copies of the written tests to be administered are photocopied or printed by the VE as needed from the "masters" that we forward. We also send along a Novice examination in the event it is needed. The Novice examination is not really part of the new volunteer examination program, but we frequently find that VE's need it to administer as a prerequisite to giving higher-class examinations. While an applicant need not pass the 5 or 13 wpm Morse code test if he can pass 20 words per minute, *all* written tests must be administered and passed in order.

Some VEC's provide a quantity of FCC Form 610 applications. Others do not. We send along one "610" with instructions that the VE's may photocopy or print it for use at their session, or they should order additional copies from the local FCC field office.

The Morse Code Test

Actually, according to the rules this is the responsibility of the VE team, not the VEC. Every VEC has code test tapes available, however. Many VE's can generate their own 5, 13, or 20 word per minute code test using their personal computers. We have a 13 wpm and a 20 wpm test tape available (at a cost of $2.50 plus 50¢ postage each) that contains 10 different QSO type tests that run for 5 minutes each. The VE simply asks 10 multiple-choice or fill-in-the-blank questions about the QSO or requires the applicant to copy for one minute solid. The format of the code test is at the option of the volunteer examiner. No sending test is required, but the VE can require one if he feels it important. As you can see, we give our VE's a lot of latitude.

Administering the Test

Now that you have the test session lined up and the test materials on the way, you are ready for the big day! Next month we cover *How to administer the test,* what to send the VEC, and what he does with it.

Announcing

The 1986 CQ World-Wide 160 Meter DX Contest

C.W.: January 24-26
Starts: 2200Z Fri.

S.S.B.: February 21-23
Ends: 1600Z Sun.

This year's rules are essentially the same as last year's. To preserve order, and to facilitate more off-continent QSO's, it is strongly recommended that DX stations work W/VE split-frequency, and announce their preferred listening spot.

Classes: Both single operator and multi-operator.

Exchange: RS(T) and QTH. State for U.S. and province for Canada. DX may use a standard prefix or a two- or three-letter country abbreviation. It helps the scorers on some handwritten logs.

Scoring: Contacts with stations in your own country, 2 points. Contacts with other countries in your continent, 5 points. Contacts with other continents, 10 points. (KH6 and KL7 are considered countries and not states.) This means U.S. and Caribbean contacts are 5 points for each other. Alaska and all North American Caribbean contacts are 5 points for W/VE.

Multiplier: Each U.S. state (maximum 48), VE province (maximum 13), DX country, and Maritime Mobile Region. U.S. and Canada do not also count as multipliers for anyone. Possible Canadian multipliers are VO1, VO2, VE1 (N.S.), VE1 (N.B.), VE1 (P.E.I.), VE2, VE3, VE4, VE5, VE6, VE7, VE8 (NWT), and VY (Yuk).

Final Score: Total QSO points times the sum of the multipliers.

Penalties: Three additional contacts may be deleted from the score for each unmarked duplicate or false contact removed from the log. A second multiplier may be removed for each one lost by the above action. An error in the state, province, or prefix may result in loss of that contact.

Disqualification: If the claimed score decreases by more than 2% as a result of removing duplicate or invalid contacts, you may be disqualified. Other causes are violation of contest rules, unsportsmanlike conduct, or violation of your country's amateur radio regulations. Disqualified stations or operators may be barred from future *CQ* contests for up to three years.

Awards: Certificates to the top scorers in each class, in each state, province, and DX country.

Special plaques for several categories will be announced in the Contest Calendar column as they become available.

Sample log and summary sheets may be obtained from *CQ* by sending a large s.a.s.e. with sufficient postage to cover your request. It is not necessary to use the official forms. You can make up your own, 40 contacts to the page, time in GMT, and columns for exchange sent and received, multiplier, and QSO points. Indicate the multiplier only the first time it is worked, and number them sequentially.

Include a summary sheet with your entry showing the scoring and other essential information, and a signed declaration that all rules and regulations have been observed. Mailing deadline for CW entries is February 28th, and March 31st for the SSB section.

Logs can be sent directly to the 160 Contest Director, Don McClenon, N4IN, 3075 Florida Avenue, Melbourne, FL 32904 USA. They can also be sent to *CQ* 160 Meter Contest, 76 North Broadway, Hicksville, NY. 11801 USA. *(Please indicate CW or SSB on the envelope.)*

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572B	55.00	8643	82.50
811A	12.00	8844	26.50
813	30.00	8873	175.00
M2057	13.00	8874	185.00
6146B	6.50	8877	495.00
6883B	6.75	8908	12.50

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MRF 245/SD1416	$30.00	SD1088	19.95
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MRF 455	13.95	2N6084	11.50

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UG255/u	2.50 ea.	(RG8/u)	$4.75 ea.
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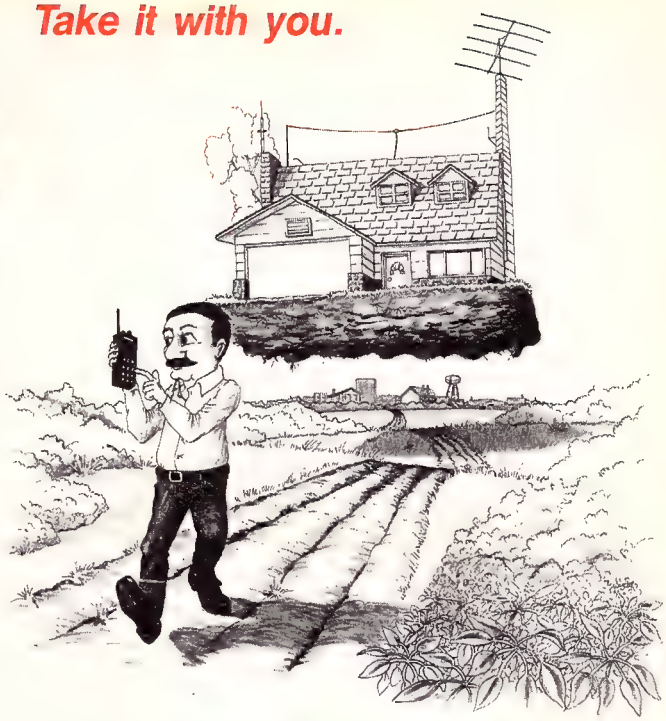

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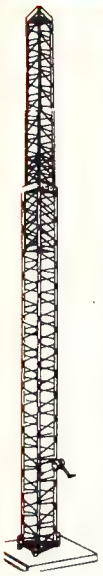

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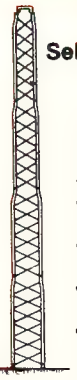

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HBX56	56 ft	10 sq ft	385	$499
HDBX40	40 ft	18 sq ft	281	$399
HDBX48	48 ft	18 sq ft	363	$489

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LM354	54.0 ft	21.0 ft	16 sq ft	$2010	$1599
LM470D (Motorized)	70.0 ft	22.0 ft	16 sq ft	$4195	$3199
DX86 (Motorized)	86.0 ft	23.0 ft	25 sq ft	$7200	Call

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Cable Type	Imped.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	.6	.9	2.3	5.2
RG8X	52	.8	1.2	3.5	6.8
RG-58/U	52	1.4	1.9	6.0	12.5
½" Alum	50	.3	.5	1.2	2.2
½" Heliax	50	.2	.4	.9	1.6
⅞" Heliax	50	.1	.2	.5	.9

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½" Alum	$19	$19	$19	$25
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64BS 4-el 6-mtr Beam
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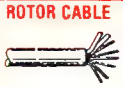

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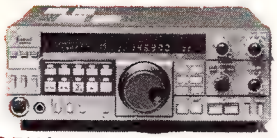

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C22	220	No	2W	20W	$ 79
C106	220	Yes	10W	60W	$179
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D24	440	No	2W	40W	$179
D1010N	440	No	10W	100W	$289

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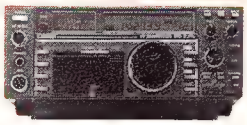

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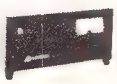

Model	'Cont. Amps	ICS Amps	Price
RS4A	3	4	$ 39
RS7A	5	7	49
RS12A	9	12	69
RS20A	16	20	89
RS20M	16	20	109
RS35A	25	35	135
RS35M	25	35	149
RS50A	37	50	199
RS50M	37	50	229

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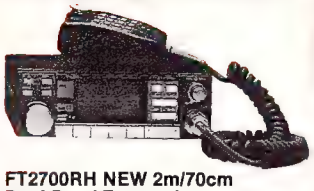

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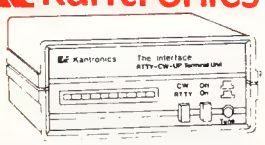

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Awards

a monthly feature by
DOROTHY H. JOHNSON, WB9RCY

NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month as told by Leo is:

S. Leo McGranaghan, WB4AIL All Counties #209, 1-2-79

"I was born in Harrisburg, Pennsylvania on December 26, 1900. As a freshman at Technical High School, I was a member of Tech High Wireless Club. The club consisted of six students with one professor in charge. In the Wireless Room they had a huge spark gap arrangement mounted on a large marble slab. That big thing had nearly scared the wits out of me. Instructions consisted of making tuning coils out of rolling pin bases, loose couplers, and condensers out of waxed paper and tin foil.

"I had a wire on the roof of my home that served as an antenna. I had a buzzer test consisting of a cat whisker with a Galena crystal. I tried many times without success to get the high noon time click as sent out from NAA in Washington, D.C. The first World War came and my interest in wireless came to a halt.

"In 1930 I moved to Miami, Florida, my home until just a few years ago. In 1938 I found the girl of my dreams, Velma, and we promptly got married. Then in 1942 came World War II. I served three years in the United States Navy Reserve doing duty mostly on Patrol Craft. Since I was from a warm part of the country, the Navy decided to send me to the Aleutians to join my ship and to cool off. After a year and a half on duty in those frigid waters off the coast of Alaska, my ship was moved to Honolulu and we had a chance to thaw out for the rest of the war.

"After the war I returned to Miami and continued my pre-war job as a special agent for Prudential Insurance Company. In 1948 I became a proud father of our only daughter, Nancy. She was certainly worth waiting for! In 1950 I changed jobs to real estate and had my own office in Miami.

"In the early part of 1970 a friend of mine convinced me that I should give ham radio a whirl. He built me an HW16 and helped me learn amateur radio. I was first licensed as WN4PGI. At that time the FCC regulations required that holders of Novice class licenses be rock bound, so I had about 15 crystals for operation on 15 meters. In September 1970, after retirement, Velma and I took a Mediterranean cruise on the Swedish American Liner Gripsholm. Being a guest and a bold Novice, I managed to find my way to the radio

S. Leo McGranaghan, WB4AIL, USA-CA All Counties #209, 1-2-79.

room. It was there that they showed me a book put out by *CQ* magazine showing the many counties they had worked. In their time off all the radio officers used to work amateurs. That did it! I was hooked! I decided to become a County Hunter, and when I returned home I sent for the book and began county hunting. I had hundreds of QSL cards from previous contacts, although many of them did not contain the county. I then got the Postal Directory and from it was able to determine the counties. I was having fun! One day someone said that I should join MARAC (Mobile Amateur Radio Awards Club). I did join and was given No. R-514. The monthly bulletins were over my head, and I suppose that they wondered why a Novice was joining MARAC.

"Back in those days a Novice license was issued for only two years. If the license was permitted to expire, the licensee could apply again for a license only after a year of waiting. After waiting that miserable year off the air I was finally given a new call, WN4DMA. I continued to pound brass and work only CW. As my second two-year period came to a close I decided I must upgrade. A summer of study prepared me for the General class exam. I passed and was given my present call, WB4AIL. I was able to complete my first 500 counties all endorsed CW on 15 meters. For the next three years after my upgrade I spent every day from band opening to band closing collecting counties on 20 meters. I added 30 pounds to my frame and completed the balance of 3075 counties. I was given USA-CA All Counties #209, dated January 2, 1979.

"In June of 1979 I repaid the favor extended me on the liner Gripsholm and introduced my nephew, John, KA2CNG, to county hunting after he upgraded his license to General class. I personally supervised the first 20 counties he worked to make sure he was on the right track.

"I want to express my thanks to each and everyone who helped me along the way. Space will not permit me to mention all the individuals who so graciously gave their time to help. To all of you I say, "Thanks!" I have attended three annual County Hunter conventions where it has been my pleasure to meet old friends. The last convention I attended was in Charleston, West Virginia. My nephew drove me there, and it was my first experience seeing how the operation runs from inside a car.

"Have you ever wondered what becomes of old county hunters? Many of them, I have found, seem to gravitate to the 3905 Century Club nets which operate evenings on 40 or 75 meters. If you are interested in working 5 band WAS, this is the place to search. If anyone is interested in working me for my USA-CA number, you will find me most evenings around 3903 on the Century Club.

"In 1982, after 52 years in Miami, Florida, Velma and I moved to Greensboro, North Carolina to be near our daughter and her family. We enjoy the four seasons there. Just recently we celebrated our 46th wedding anniversary and my 84th birthday. I hope I will be able to attend my 4th Annual County Hunters Convention one of these years.—73, Leo, WB4AIL"

Yas, JH8GWW, and Kazuo, JA8JL, shown in Kazuo's radio shop in Sapporo. Yas has just received USA-CA 1000 #880.

333 South Lincoln Ave., Mundelein, IL 60060

MISSOURI RADIO CENTER

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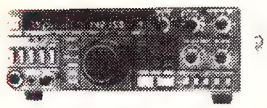

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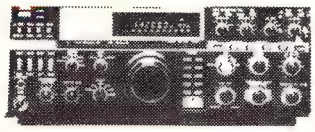

TS-930S Top of the Line HF Transceiver

- General Coverage Receiver • Superior Dynamic Range • All Solid State—28 VDC Final • QSK CW • Optional Automatic Antenna Tuner • Dual VFO w/8 Memories • Dual Mode Noise Blanker

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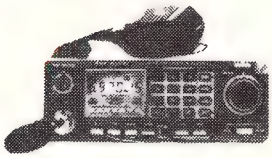

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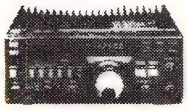

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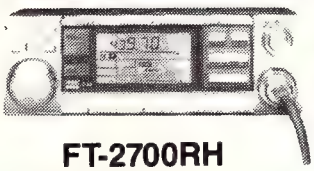

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FT-209RH

- 5 Watts
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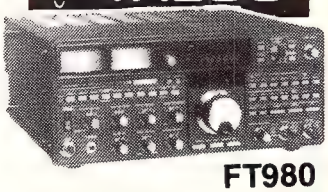

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Special Honor Roll

John McCallum, KØIFL
All Counties #493, 6-12-85
Lorraine Bachmann, WDX9DCJ
All Counties #494, 6-19-85

Honor Roll

3000		1500		W3IJT	2034
KØIFL	523	KØIFL	715	YU4GD	2035
WDX9DCJ	524	WDX9DCJ	716	KT2C	2036
				KA9IKG	2037
2500		1000		SM5FQQ	2038
KØIFL	585	JH8GWW	880	HAØDU	2039
WDX9DCJ	586	W5OBT	881	OH3ES	2040
				N9BAE	2041
2000		500		WD9ITQ	2042
KØIFL	641	WB2GHA	2032		
WDX9DCJ	642	J88AQ	2033		

Awards Issued

John McCallum Carter, KØIFL, finished them all and won USA-CA 1500 #715, USA-CA 2000 #641, USA-CA 2500 #585, USA-CA 3000 #523, and All Counties #493, all Mixed, all dated 6-12-85.

Lorraine Bachmann, WDX9DCJ, continued to listen well and qualified for the following additional awards: USA-CA 1500 #716, USA-CA 2000 #642, USA-CA 2500 #586, USA-CA 3000 #524, and All Counties #494. All awards are endorsed SSB, Mixed Bands. Lorraine is the first SWL in Wisconsin and the third SWL to win USA-CA All Counties.

Yasu-Tada Nimomiya, JH8GWW, added a gold seal to his certificate for USA-CA 1000 #880, 6-7-85, Mixed. Yasu's first 500 counties were all 10 meter SSB; his second 500 were all 20 meter SSB.

Robert D. Lee, W5OBT, continued to be heard with his fine signal from New Mexico, and now has USA-CA 1000 #881, Mixed, 6-14-85.

USA-CA 500 certificates went to:

Thomas James Arey, WB2GHA, USA-CA 500 #2032, All 20M/SSB, Mobile, 6-3-85.

Bill Providence, J88AQ, USA-CA 500 #2033, Mixed, 6-8-85. Bill's award is #1 to St. Vincent.

George Dessert, W3IJT, USA-CA 500 #2034, All SSB, 6-10-85.

Rajko Mackic, The Akademski Radio Klub, YU4GD, USA-CA 500 #2035, Mixed, 6-12-85.

Russell Pike, KT2C, USA-CA 500 #2036, All CW, 6-15-85.

Robert Tirk, KA9IKG, USA-CA 500 #2037, Mixed, 6-19-85.

Jan A. Petterson, SM5FQQ, USA-CA 500 #2038, Mixed, 6-25-85.

Istvan Bogyo, HAØDU, USA-CA 500 #2039, Mixed, 6-25-85. This is first USA-CA to Hungary.

Jauko Kurkisno, OH3ES, USA-CA 500 #2040, 6-26-85, All CW.

June A. Geiger, N9BAE, USA-CA 500 #2041, 6-26-85, All 2M/FM, Simplex, Mobile to Mobile. June's award is the first USA-CA endorsement for all 2M Simplex.

Robert H. Geiger, WD9ITQ, USA-CA 500 #2042, All 2M/FM, Simplex, Mobile to Mobile, 6-26-85. Roby has the second USA-CA endorsement for 2M Simplex.

Awards Available

Very High Speed Club. The Radio Telegraphy Very High Speed Club was founded in May 1961 under the auspices of DARC and VERNON. The goal of the club is to gather operators who are able to transmit and copy very high speed telegraphy. Membership is gained by having four 30-minute contacts with existing members at a speed of at least 40 wpm. Copy must be solid and no keyboard or decoders may be used. The four recommendations should be sent with the application and accompanied by 10 IRC's or the equivalent. A declaration that a keyboard or decoder was not used must be included, and all must be sent to the VHSC Secretary. Life membership is granted with no further payment. For further information, and a list of the VHSC members, contact VHSC Secretary, PAØDIN, Din J. Hoogma, Schoutstraat 15, 6525 XR Nijmegen, Netherlands.

Worked DIG Members Award.

Worked Dig Members. The W-DIG-M may be applied for by all licensed radio amateurs and SWL's who can prove contact with DIG members as follows.

Class 3—DX stations work 15 DIG members, EU stations work 50 DIG members. Class 2—DX stations work 30 DIG members, EU stations work 75 DIG members. Class 1—DX stations work 50 DIG members, EU stations work 100 DIG members. All QSL's of DIG members listed in the DIG member list and the new DIG members published in the DIG nets are valid for this award. Expedition calls do not count additionally—either the home call or the expedition call.

The diploma is available for contacts on all shortwave bands and modes (mixed) or for contacts in CW only (CW Award) or for contacts on the VHF/UHF bands only (VHF Award). For worked 100 additional DIG members there are stickers up to 2000 DIG members (SASE or SAE plus 1 IRC). No QSL's, only GCR list and fee of 7 DM or 10 IRC's. Apply to Award Manager, Werner Theis, DB7PY, Auf dem Forst 25, D-5400 Koblenz, Federal Republic of Germany.

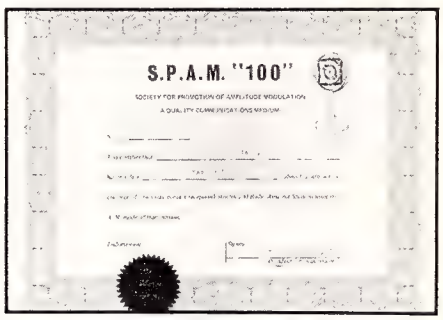
Specialized Communications Achievement Award.

Specialized Communications Award. This award is for FSTV, SSTV, FAX, RTTY, OSCAR, EME, Microwave, etc. Work over 50 miles on ATV, special-event projects on ATV, 25 DX countries on SSTV, 10 or more FAX two-way transmissions on HF bands, 10 contacts or more on AMSAT, 25 countries on RTTY.

The Specialized Communications Award is available only to subscribers of *Amateur Television Magazine.* For further information, send SASE or SAE and 1 IRC to *Amateur Television Magazine,* P.O. Box H, Lowden, IA 52255.

The New SPAM Award. The Society for the Promotion of Amplitude Modulation is pleased to announce the SPAM "100" Award. This award will be available to:

1. Regular SPAM members and officials for confirmation (by QSL card or letter) of two-way contact with 100 AM stations on the bands.



The "SPAM" Award.

2. SPAM Auxiliary (SWL/DX) members who submit the satisfactory evidence (confirmation by QSL card, letter, or special SPAM reception report form) of reception of the signal of 100 radio amateurs using the AM (DSB full carrier or SSB with carrier insertion) mode.

An attractive gold-color certificate for the SPAM "100" will be issued to each award winner. Send application and fee of $5.00 US to: F.A. Dunlap, SPAM President, 14113 Stoneshire, Houston, TX 77060.

Notes

Once more the season changes and summer holidays are a pleasant memory. Now we look forward to winter again in northern Illinois. I hope things are going well where you are.

73, Dorothy, WB9RCY

a monthly feature by
BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Novice Licensing Data—Part IV

This article covers all of the material one must know to pass an FCC Novice written examination (FCC element two). All parts should be studied prior to attempting to pass the test. The first part of this article provides the overall introduction to this instruction material, plus complete coverage of electrical principles. Parts II and III appeared in the last two issues of *CQ*; they provided in-depth coverage of circuit components, practical circuits, signals and emissions, and operating procedures. Previous issues of *CQ* are usually available at $2.25 each; requests can be sent to *CQ*, 76 North Broadway, Hicksville, NY 11801. If you know someone who is interested in becoming an amateur radio operator, you should bring this article to his or her attention.

Amateur Radio Practices

2D-1.1 How can an amateur radio station be protected against being operated by unauthorized persons? Lock the radio shack and/or the equipment input power switch. Hide equipment input power switch. Have station input on a separate line which is disabled when station is not to be used. Post a sign prohibiting unauthorized operation. Do not leave the station ready to be operated as soon as power is turned on. The automatic final RF amplifier power reduction protective feature built into modern transceivers provides an easy way to eliminate unauthorized full-power output; simply switch to an antenna that is incompatible with the band selected at the transceiver. *(The March 1985 Novice column covers the use of electric power in fixed stations. That article includes suggestions that can be followed to minimize the possibility of unauthorized station use.)*

2D-2.1 Why should all antenna and rotor cables be grounded when an amateur radio station is not in use? Such grounding protects station equipment from possible lightning and/or static discharge damage. Such electrical discharges should go directly to a suitable ground, without going to station equipment. The input coil of the receiver provides the discharge path in any station that does not have a separate grounding system. This is because the receiver is connected to the antenna system whenever the station is not in transmit mode.

2D-2.2 How can an antenna system be protected from damage due to a nearby lightning strike? The tower, plus all other nonradiating parts of the antenna system, should be connected to a good electrical ground. Whenever the station is not in use, the antenna system's radiating parts should also be grounded. The National Electric Code provides electrical wiring and grounding information that applies to amateur radio stations. This book should be available in every public library. It is essential reading for all amateurs. Article 810 is of particular importance to amateurs. *(The September through November 1978 Novice columns cover amateur radio station grounding in detail. The November 1977 through March 1978 Novice columns include general grounding information within this article about amateur radio station installation tips. The April 1983 Novice column covers electric shock information that amateurs should know.)*

2814 Empire Ave., Burbank, CA 91504

This is 14-year-old Mike Franzwa, KB6CDP, of Castro Valley, California. He has been licensed since September 1983. Mike has already contacted amateurs in 48 states and 13 countries. He won Easy Bay honors in the last ARRL Novice Roundup Contest. His station includes a Heath DX-40 transmitter with external VFO, Hallicrafters SX-101 receiver, Hustler 4-BTV vertical, and an 80 meter dipole.

2D-2.3 How can amateur radio station equipment be protected from damage due to lightning striking the electrical wiring in the building? Input power plugs can be disconnected from AC wall receptacles before a storm arrives. If a separate AC input power circuit breaker is used to feed the amateur radio station equipment, it can be pulled (opened) prior to the arrival of the storm. Most of the modern amateur radio equipment has surge protection built in to minimize the possibility of such damage.

2D-3.1. For proper protection from lightning strikes, what pieces of equipment should be grounded in an amateur radio station? All items in metal enclosures should be grounded to a common point, and that point should be connected to a satisfactory station ground. All ground leads should be at least ten-gauge wire, with ground cable preferred for use in this application.

2D-3.2. What is a convenient indoor grounding point for an amateur radio station? A cold-water pipe is the answer required in the test. However, I have helped install more than 1000 stations, and I have yet to find a cold-water pipe that provides a suitable ground. This answer would only be true if copper piping was used throughout the building.

2D-3.3. To protect against electrical shock hazards, the chassis of each piece of equipment in an amateur radio station should be connected to what? Each chassis should be connected to the common ground point, which is usually the chassis ground stud of the transmitter/transceiver. That common ground point is, in turn, attached to an effective station ground via the shortest possible length of ground braid, or large diameter wire.

2D-4.1. When working on an antenna mounted on a tower, a person doing the climbing should always wear what type of safety equipment? A safety belt.

2D-4.2. For safety purposes, how high should all portions of a horizontal wire antenna be located? It should be located as high as it can be installed. It should be at least at a height where tall people cannot touch it. Secondarily, it should be located where is cannot come in contact with power lines, if either the power lines or the antenna (and feedline) fall. Neither the antenna, nor its feedline, should be in close proximity or in line with either AC power or telephone lines.

2D-4.3. What type of safety equipment should a person on the ground wear while assisting another person on an antenna tower? A safety helmet (hard hat), and possibly an eye shield.

2D-5.1. What is a likely indication that radio frequency interference to a receiver is caused by front-end overload? The resultant RF interference would exist over a wide frequency range. In the case of television interference (TVI), it would distort reception on several channels.

2D-5.2. When radio frequency interference occurs to a receiver regardless of frequency, while an amateur radio station is transmitting, what is likely the problem? Receiver front-end overload is the most common cause of this problem. Another cause of this difficulty could be the TV receiver using a processing frequency (such as a local oscillator or intermediate frequency) that is the same (or close to) the amateur transmitting frequency.

2D-5.3. What type of filter should be installed on a television receiver's tuner input as the first step in preventing overload from an amateur radio station's signal? A high-pass filter should be installed at the tuner of the TV receiver to block lower frequency (3–30 MHz) amateur emissions, while passing the higher frequency TV signals.

2D-5.4. What is meant by receiver overload? Receiver overload is a condition wherein an extremely strong signal swamps the front end of a receiver, distorting reception over a wide range of frequencies.

2D-6.1. What is meant by harmonic radiation? A harmonic frequency is any fundamental frequency multiplied by a whole number (such as 2, 3, 4, etc.). Every transmitter radiates unintended harmonics along with the desired fundamental frequency, but such harmonic (multiple) frequencies must be at a much lower power level than the fundamental. Harmonic radiation is a very low level emission that occurs inadvertently at integral multiples of the fundamental frequency.

2D-6.2. Why is harmonic radiation by an amateur radio station undesirable? The harmonics may interfere with other radio services, since they may not fall within an amateur radio band. Also, any power transmitted on harmonic frequencies is power that is subtracted from the fundamental (intended) frequency output. A

typical example of harmonic interference is amateur 10 meter (28–29.7 MHz) operation causing second harmonic interference to TV channel 2 (54–60 MHz).

2D-6.3. A multi-band antenna connected to an improperly tuned transmitter may radiate what type of interference? Harmonic interference. As an example, if the antenna is resonant at 7, 14, 21, and 28 MHz, a 7 MHz fundmental (intended) output emission could be accompanied by second, third, and fourth harmonic (14, 21, and 28 MHz) which the multiband antenna would accept and radiate.

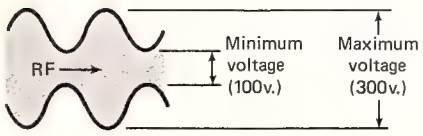
2D-6.4. What is the purpose of properly shielding a transmitter? Proper shielding prevents various processing frequencies from being radiated by the transmitter. Shielding also protects transmitter circuits from nearby electromagnetic energy which could otherwise degrade transmitter output.

2D-6.5. When interference is observed on only one or two channels of a TV receiver while an amateur radio station is transmitting, what is the likely problem? The most likely cause of such interference is harmonic radiation from an amateur radio transmitter. A low-pass filter could be installed between the amateur's transmitter and antenna system to alleviate (minimize) such a problem.

2D-6.6. What type of filter should be installed on an amateur radio transmitter as the first step in reducing harmonic radiation? A low-pass filter which passes the amateur HF (3–30 MHz) signals with very little attenuation (loss) while offering high rejection to TV VHF (30–300 MHz) and UHF (300–3000 MHz) signals.

2D-7.1. Why is it important to have the impedance of a transmitter final-amplifier circuit match the impedance of the antenna or feedline? Matched impedances provide maximum undistorted power transfer from the transmitter into the antenna. Matched impedances also provide maximum signal transfer between the antenna and the receiver. Impedances should be matched between the transceiver and the feedline, as well as between the feedline and the antenna. Matched impedances minimize the standing-wave ratio (SWR) that would otherwise exist. A high SWR condition reduces power transferred from the transmitter to the antenna, and from the antenna to the receiver.

2D-7.2. What is the term for the measurement of the impedance match between a transmitter final amplifier circuit and the antenna or feedline? Standing-wave ratio (SWR). This is simply the ratio between the high and low voltage points that exist along a feedline that is not perfectly matched to the antenna and/or transmitter/transceiver. An SWR of 3 to 1 (3:1) represents the following waveshape being present along the transmission line.

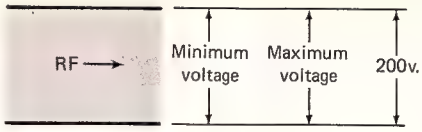


$$SWR = \frac{E\ max}{E\ min} \text{ or } \frac{I\ max}{I\ min}$$

In this example,

$$SWR = \frac{E\ max}{E\ min} = \frac{300}{100} = 3\ (3{:}1)$$

If impedances were perfectly matched in this example, both the maximum and minimum voltage would be 200 volts, and the SWR would be 1:1.



$$SWR = \frac{E\ max}{E\ min} = \frac{200}{200} = 1\ (1{:}1)$$

An SWR of 3:1, or better (lower), is considered to indicate that satisfactory impedance matches exist between the transceiver and feedline, and between the feedline and antenna. Most of the modern transceivers are designed to automatically reduce RF final amplifier input power if the antenna system causes the SWR to exceed 3:1.

2D-7.3. What station accessory is used to measure RF power being reflected back down the feedline from the transmitter to the antenna? This question is asked incorrectly. It is the power that is not accepted by the antenna (due to impedance mismatch) that is reflected back down the feedline from the antenna to the transmitter. The device used to measure reflected power is the reflectometer, which is commonly called the standing-wave-ratio (SWR) bridge. The SWR bridge reads forward and reflected voltages; it automatically displays the SWR as determined by the following formula.

$$SWR = \frac{E\ fwd + E\ ref}{E\ fwd - E\ ref}$$

where:

E fwd is forward voltage
E ref is reflected/reverse voltage

The operator simply adjusts the SWR bridge to show a full-scale reading in the forward direction. The SWR bridge is then switched to show reflected (reverse) voltage, and the SWR is read off the meter scale.

2D-7.4. What station accessory is often used to measure voltage standing-wave ratio? A voltage standing-wave ratio (VSWR) bridge, which is commonly called an SWR meter, and is occasionally called a reflectometer.

2D-7.5. Where should an SWR bridge be connected to indicate the impedance match of a transmitter and an antenna? The only true reading occurs when the SWR meter is connected between the far end of the feedline and the input to the antenna. However, it is usually extremely difficult to adjust or read the SWR meter when it is attached to the antenna; consequently, it is usually installed in the radio shack, between the transceiver and the feedline. This latter installation configuration provides easy access to the SWR bridge, but the resultant readings are less accurate than the readings that would be available with the SWR bridge connected to the antenna (at the far end of the transmission line). This situation is due to the fact that the SWR bridge is not comparing the true forward and reflected voltages of the antenna when it is installed in one's radio shack. The shack-installed VSWR bridge sees a forward voltage that is higher than the voltage that will actually be applied to the input terminals of the antenna. This situation exists because there will be signal attenuation (loss) as the transmitter output travels along the feedline to the antenna. Similarly, the SWR bridge in one's radio shack reads a lower reflected voltage than exists at the antenna terminals; this is due to the reflected signal being attenuated (reduced) as it travels along the feedline from the antenna back towards the transmitter/transceiver and through the SWR bridge. Consequently, the SWR bridge in the shack sees a higher forward voltage and a lower reflected voltage than those which exist at the antenna terminals. If the feedline is very bad, the shack-installed VSWR bridge could indicate a reasonable SWR despite a terribly bad mismatch condition existing between the feedline and the antenna. An apparent SWR improvement with time is usually due to feedline deterioration and increased signal attenuation (loss).

2D-7.6. Coaxial feedlines are designed to be operated with what kind of standing-wave ratio? A low standing-wave ratio (SWR). However, most types of coaxial cables are designed to withstand reasonably high standing-wave ratios. High SWR's produce high maximum voltages between the center (go) line and the return (shield) of the coaxial cable. An excessively high voltage can puncture (short circuit) the insulation between the conductors of a coaxial cable. *(The August 1983 Novice column provides information about military radio frequency transmission lines. It is a useful article for new amateurs to read.)*

2D-7.7. If the SWR bridge reading is higher at 3700 kHz than at 3750 kHz, what does this indicate about the antenna? It usually indicates that the antenna is closer to being resonant at 3750 kHz than at 3700 kHz. The SWR is generally lowest (minimum/best) when the frequency of the input signal matches the resonant frequency of the antenna.

2D-7.8. If the SWR bridge reading is lower at 3700 kHz than at 3750 kHz, what does this indicate about the antenna? It usually indicates the antenna is closer to being resonant at 3700 kHz than at 3750 kHz. However, the impedance of a dipole changes in relationship to its height above electrical ground. *(The May through July 1983 Novice columns cover dipole antennas in detail. Since the dipole is the first antenna most new amateurs erect, this previous article is worthwhile reading.)*

2D-8.1. What kind of SWR meter reading may indicate poor electrical contact between parts of an antenna system? A high SWR reading could indicate an unsatisfactory condition requiring correction. The problem could be poor connections between the transceiver and SWR bridge, the SWR bridge and the feedline, or the feedline and antenna. A high VSWR reading could also be due to an antenna problem. Poor contacts in an antenna system usually produce SWR readings far greater than 3:1, which is generally recognized as the acceptable (maximum) SWR limit.

2D-8.2. High SWR reading measured from a half-wave dipole antenna being fed by coaxial cable can be lowered by doing what to the antenna? The test answer to this question is to lengthen or shorten the antenna to lower the SWR. This is a silly answer. If a dipole has been cut to the correct length, and it has been assembled properly, its length should not be varied. The input impedance varies in accordance with the antenna's height over electrical ground. Consequently, it should help to raise or lower the antenna. If you can change it both directions, raise it to a height where the resultant SWR is minimum.

Part IV Summary

This completes the fourth part of this series. We have covered six of the nine subelements (subjects) contained in the FCC element two (Novice) syllabus. The next few Novice columns will cover the rules and regulations. Seven of the 20 questions in each Novice written examination are on rules and regulations, which is 35 percent of the exam.

Contest Calendar

a monthly feature by
FRANK ANZALONE, W1WY

NEWS/VIEWS OF ON-THE-AIR COMPETITION

As mentioned in last month's column, there have been a few changes and additions to the trophy and plaque awards in our 1985 World-Wide DX Contest. The most notable change is the sponsorship of the World All-Band Phone award, which Bill Leonard, W2SKE, has been donating for almost 30 years. Bill has turned over the sponsorship of this award to Dave Rosen, K2GM, who will continue it as a memorial for his father, the late, well-remembered "Doc" Rosen, WA2RAU.

Our grateful thanks to Bill, who along with the late Larry LeKashman (W2IOP at the time) started the trophy awards list which now numbers over 60.

The late Don Wallace, W6AM, and "Buzz" Reeves, K2GL, are also long-time donors. Don's award is being continued as a memorial by the Southern California DX Club, of which Don was a member.

The Carib./C.A. awards vacated by Jim Neiger, N6TJ, have been picked up by Alex Kasevich, VP2MM, on phone, and Peter Munroe, WB1DQC, on CW.

The Carolina DX Association and the Southern New England DX Club have picked up the USA Multi-Single Phone and the European Single-Band CW awards terminated by K8NA and the G2LB memorial.

An added new one is the South American All-Band CW Memorial sponsored by the Venezuela DX Club.

I am sure that you will note that many of these awards are memorials. Can you think of a more appropriate way to perpetuate the call of a deceased club member? The North Jersey DX Association has been doing this for years for two of their "Silent Keys," K2HLB and W2JT.

Questions regarding future sponsorship of awards in any *CQ* contest can be addressed to me, and I will make sure they are forwarded to the respective contest directors. We are especially looking for donors of awards in our 160 Meter Contest coming up in January and February 1986. However, we must hear from you as soon as possible, as time is running out.

Deadline for the January issue is October 15th and November 15th for February. Sending your announcements to my home address will give additional time.

Have you checked the expiration date of your license lately?

73 for this time, Frank, W1WY

14 Sherwood Road, Stamford, CT 06905

Calendar of Events

*	Oct.	5-6	California QSO Party
	Oct.	5-6	Ibero-American SSB Contest
	Oct.	5-6	ARRL CW QSO Party
	Oct.	5-6	VK/ZL/Oceania SSB Contest
	Oct.	5-7	Kansas State QSO Party
*	Oct.	6-7	Illinois QSO Party
	Oct.	12-13	VK/ZL/Oceania CW Contest
	Oct.	12-13	Pennsylvania QSO Party
	Oct.	12-13	ARCI QRP CW Contest
	Oct.	12-13	ARRL Phone QSO Party
	Oct.	13	RSGB 21/28 MHz Phone
	Oct.	16-17	YLRL Anniv. CW Party
	Oct.	19-20	Boy Scouts Jamboree
	Oct.	19-21	Rhode Island QSO Party
	Oct.	20	RSGB 21 MHz CW Contest
	Oct.	**26-27**	**CQ WW DX Phone Contest**
	Oct.	30-31	YLRL Anniv. SSB Party
	Nov.	2-3	IPA Radio Club Contest
	Nov.	2-4	ARRL CW Sweepstakes
	Nov.	9-10	European RTTY Contest
	Nov.	9-10	Silver Jubilee "Electril"
	Nov.	16-18	ARRL Phone Sweepstakes
	Nov.	**23-24**	**CQ WW DX CW Contest**
	Dec.	7-9	ARRL 160 Meter Contest
	Dec.	14-15	ARRL 10 Meter Contest

** Covered last month.*

Ibero-American SSB DX Contest

2000Z Sat. to 2000Z Sun., Oct. 5–6

Organized by the URE of the "Valles Oriental" section, this contest commemorates the "Hispanidad," which is celebrated on October 12th.

Single operator only, on all 6 bands, 10 to 160 meters.

Exchange: RS plus a QSO number starting with 001.

Points: Between Ibero-American stations 3 points per QSO, non-Ibero stations 1 point. A station may be worked once on each band for QSO and multiplier credit.

Multiplier: Each Ibero-American station worked on each band: CE, CO, CP, CR, CT, CX, C3, C9, DU, EA, HC, HI, HK, HP, HT, KP4, LU, OA, PY, TG, TI, XE, YS, YV, ZP, 3C, and DXCC Dependences.

Score: Total QSO points times the Ibero-American multiplier from each band.

Awards: A plaque will be issued to the champion outside the Ibero-American area, and to the high scores in each continent and DXCC countries. A minimum of 4 hours and 75 QSO's must be worked to be eligible for the awards.

There is an SWL section with the same scoring conditions. A special plaque will be awarded to the winner who has participated 5 or more years.

All entries must be postmarked no later than November 30th and go to: Delegacion Comarcal URE Valles Oriental, P.O. Box 262, Granollers (Barcelona), Spain.

Kansas State QSO Party

0100Z to 0700Z Sat., Oct. 5
1300Z Sat. to 0700Z Sun., Oct. 5–6
1300Z Sun. to 0100Z Mon., Oct. 6–7

This is the fourth annual QSO Party sponsored by the Boeing Employees' ARS of Wichita, Kansas.

The same station may be worked on each band and each mode, for contact points, and more than once if they are additional multipliers. Kansas can work in-state stations for QSO and multiplier credit.

Exchange: QSO no., RS(T), and QTH. County for Kansas; state, province, or country for others.

Scoring: Two points for phone QSOs, three points if on CW. Kansas stations multiply total QSO points by the sum of different states, VE provinces, and DX countries worked.

Others will use sum of different Kansas counties worked for their multiplier (counted once only, maximum of 105). There is also a bonus multiplier of one for each group of 8 QSOs with the same Kansas county.

Frequencies: CW—1805, 3560, 7060, 14060, 21060, 28160. SSB—1815, 3925, 7260, 14280, 21380, 28580. Novice—3725, 7125, 21150, 28160.

Awards: Certificates to the top-scoring station, both single and multi-operator, in each state, VE province, DX country, and Kansas county. Work five club members and you will be eligible for the worked five Kansas Bears Award.

Include a summary sheet and a dupe sheet if your log shows more than 200 contacts. The usual signed declaration is also required. Logs and summary sheets are available; include a large SASE with your request to the address below.

Mailing deadline for all entries is November 12th to: Boeing Employees' A.R.S., c/o Mike Thornton, WA@TAH, P.O. Box 16534, Wichita, KS 67216.

ARRL QSO Party

C.W.: Oct. 5–6 Phone: Oct. 12–13
1800Z Saturday to 0600Z Sunday

This event is similar to the annual Open CD Party, which has been phased out, and it is open to *all* ARRL members. Operate a maximum of 10 hours out of the 12-hour period. Off times must be at least

30 minutes and must be clearly indicated in the log.

Exchange: Your "status" and ARRL section (MBR member, ORS official relay station, etc.).

Scoring: Total QSO's from all bands times number of ARRL sections worked (maximum of 74). Phone and CW are separate and require separate logs. A dupe sheet is also required if you make more than 200 contacts.

Referring you to a current issue of *QST* for more details is academic, since all members of course receive *QST*. Anyway, be sure to get your entry to the ARRL, 225 Main Street, Newington, CT 06111 within a month of the above dates.

VK/ZL/Oceania DX Contest

SSB: Oct. 5–6 CW: Oct. 12–13
1000Z Saturday to 1000Z Sunday

There have been some small modifications in the rules of this year's old-time contest. This year it commemorates the 75th anniversary of the Wireless Institute of Australia and the 50th year of the VK/ZL contest.

Following rules are for stations other than VK/ZL. Oceania stations can work anyone. The rest of the world work VK, ZL, and Oceania stations only. The same station may be contacted on each band for QSO and multiplier credit (no WARC bands).

Exchange: RS(T) plus a three-figure QSO number starting with 001.

Scoring: Same for everybody, 2 points per QSO.

Multiplier: Each VK/ZL and Oceania prefix worked on each band.

Final Score: Total QSO points from all bands times the sum of the prefix multiplier from each band.

Awards: This year there will be awards to the top scorers in each continent. These will be in the form of leather-bound log books, and medallions to the top scorers in countries that submit 10 or more entries. Certificate awards will be made at the discretion of the contest manager.

There is an SWL section. Only VK, ZL, or Oceania stations are reported. Call of station being worked and RS(T) being sent and received must be reported. Scoring same as above, but SSB and CW scores are combined for final score.

Include a summary sheet showing the scoring, use separate log sheets for each band, and include the usual signed declaration that all rules and regulations have been observed.

This year they go to: W.I.A. VK/ZL/O Contest Manager, 1 Noorabil Court, Greensborough, Vic. 3088, Australia. All entries must be received no later than January 31, 1986.

ARCI QRP CW Contest

1200Z Sat. to 2400Z Sun., Oct. 12–13

This is the fall edition and 24th anniversary of the QRP Amateur Radio Club International. This year's activity will be found on CW only. Participants may operate the full 24 hours.

Exchange: RS(T) and state, province, or country. Members will include their number; non-members their power output.

Scoring: Contacts with members, 5 points. Non-members, 2 points if in same continent, 4 points if in a different continent. The same station may be worked on each band for QSO and multiplier credit.

There is a power output bonus: 4 to 5 watts— × 2; 3 to 4 watts— × 4; 2 to 3 watts— × 6; 1 to 2 watts— × 8; less than 1 watt— × 10; over 5 watts check log only.

The following bonus multipliers are also available: solar or wind power— × 2; battery power— × 1.5. Must be used for duration of contest.

Multiplier: Each state, VE province, and DX country worked on each band.

Final Score: Total QSO points from all bands × (states + provinces + countries) × power bonus × power type if any.

Frequencies: 1810, 3560, 7040, 14060, 21060, 28060, 50360. Novice—3710, 7110, 21110, 28110.

Awards: Certificates to the highest scorers in each state, province, and DX country with two or more entries. All entries will be considered for the Triple Crown QRP Award. In addition, Adrian Weiss, WØRSP, is sponsoring a special *Milliwatt* certificate to be awarded to the top-scoring station in the less than 1 watt category, providing there are two or more entries in that category.

Use a separate log sheet for each band. Include a summary sheet showing the scoring, equipment description, and other essential information. Include a large SASE for a copy of the results. It is suggested you send a large SASE to KA5NLY for official log forms.

Logs must be received by November 13th and go to: QRP ARCI Chairman, Gene Smith, KA5NLY, P.O. Box 55010, Little Rock, AR 72225.

Pennsylvania QSO Party

1600–0500Z Sat.–Sun., Oct. 12–13
1300–2200Z Sun., Oct. 13

This is the 28th annual party sponsored by the Nittany A.R.C. of State College, Pennsylvania. The same station may be worked on each band and mode for QSO points. PA stations may also work other PA stations for QSO and multiplier credit. Mobiles may be worked in each county change.

Exchange: RS(T), three-digit QSO number, and QTH. County for PA, ARRL section for others.

Scoring: One point for SSB contacts, 1.5 points for CW, 2 points for CW on 80 and 160.

PA stations multiply total by ARRL sections + PA counties + 1 DX country worked. Others use PA counties for their multiplier (maximum of 67).

Mobiles add 500 bonus points for each county operated from, minimum of 10 QSOs. Mobiles on county lines give one QSO number but get credit for two multipliers.

Frequencies: CW—1810 and 40 kHz up from bottom edge of each CW band. SSB—1850, 3980, 7280, 14280, 21380, 28580. Novice—10 up from bottom of each Novice band. Mobile—5 kHz below listed frequencies. Try 160 at 0300Z.

Awards: Will be made in five classes—single operator, multi-single, multi-multi, mobile, and QRP (maximum 5 watts). Certificates to winners in each county, each section, and club (minimum of 3 members and 20 QSOs). Plaques to top scorers in both eastern and western PA, out-of-state, both multi's, mobile, western USA, and QRP (*quite a selection—ed.*).

Include a summary sheet with your entry showing the scoring, a check list of counties or sections worked, and a dupe sheet if you make 100 or more contacts. There is a severe penalty of 100 points deducted for each dupe that has not been removed.

Official log forms are recommended and are available from W3HDH. For a copy of the results send 50¢ (no SASE).

Mailing deadline for entries is November 15th to: Douglas R. Maddox, W3HDH, 1187 S. Garner Street, State College, PA 16801.

YLRL Anniversary Party

C.W.: Oct. 16–17 Phone: Oct. 30–31
1800Z–1800Z Wed.–Thurs.

This is the 46th annual party run by the YL Radio League. It is open to all YL's around the world, and activity is between YL's only on all bands, 3.5 through 28 MHz. Phone and CW are separate contests and require separate logs and awards.

Exchange: QSO no., RS(T), and ARRL section. DX stations will indicate their country.

Scoring: One point per QSO between stations within an ARRL section and between DX stations. Two points if the QSO is between a DX station and an ARRL section station. The same station may be worked *once only* regardless of the band.

Multiplier: Is figured from the number of ARRL sections and DX countries worked. There is also a low power multiplier of 1.25 if power input is 150 watts or less on CW, 300 watts PEP on SSB.

Final Score: Total QSO points from all bands times the ARRL sections and DX countries worked times the power multiplier.

For each duplicate contact that is removed from the log in the course of checking, a penalty of three additional and equal contacts will be exacted.

Frequencies: CW—3555, 7055, 14055,

21195, 28195. SSB—3955, 7255, 14295, 21395, 28595. (Plus or minus 15 kHz.).

Awards: Gold cups to the top scorers in each contest. A plaque to the highest combined phone/CW score, and the Corcoran and Hagen memorial plaques. Certificates to the first, second, and third place overall winners and in each U.S. and VE call area and DX country. Only YLRL members are eligible for the cup and plaques.

Logs must be received no later than December 10, and this year go to: Marty Silver, NY4H, 3118 Eton Road, Raleigh, NC 27608.

RSGB 21/28 MHz Phone Contest

0700 to 1900 GMT Sunday, Oct. 13

It's the world working the British Isles on 21 and 28 MHz.

The same station may be worked on each band for QSO and multiplier credit. There are a total of 42 prefixes available on each band. Following are the rules for areas other than the British Isles.

Sections: Single operator and multi-operator, both bands only, and SWL.

Exchange: RS report plus a progressive QSO number starting with 001.

Scoring: Each contact with a B.I. station is worth 3 points. Multiply total QSO points from each band by the sum of B.I. prefixes worked on each band (maximum of 42 per band). The GB prefix does not count for QSO or multiplier.

Unmarked duplicate contacts will be penalized 10 times the points claimed. Logs containing more than 5 unmarked duplicates will be disqualified.

There is also an SWL section. Only B.I. stations are to be logged. Scoring is the same as indicated above. The same call sign may appear once only in every three contacts, except when the logged station is a new multiplier.

Awards: Overseas stations will be awarded certificates to the leading station in each country and the leading station in the multi-operator section, and to the SWL winner in each country. The first, second, and third overall winners will also receive certificates of merit.

Separate log sheets are required for each band. Include a summary sheet showing the scoring, prefixes worked, and a signed declaration that rules and regulations have been observed.

Logs must be received by December 3rd. This year they go to: RSGB HF Contests Committee, c/o M. Harrington, 123 Clensham Lane, Sutton, Surrey SM1 2ND, England.

RSGB 21 MHz CW Contest

0700 to 1900 GMT Sunday, Oct. 20

Like the 21/28 MHz Phone Contest, the activity in this one is between the British Isles and the rest of the world. Competition is limited to single operator stations only. There is a separate QRP section in which power input must not exceed 10 watts, and there is also an SWL section.

The following rules are for areas other than the British Isles.

Exchange: RST report plus a progressive QSO number starting with 001.

Scoring: Each contact with a B.I. station is worth three points. Multiply total QSO points by the number of B.I. prefixes worked (G2, G3, GD3, etc.). A maximum of 42 is possible. (GB does not count for QSO or multiplier.)

Unmarked duplicate contacts for which credit has been taken will be penalized ten times the points claimed. Logs containing more than five unmarked duplicates will be disqualified.

Only British Isles stations are to be logged by overseas SWL's. The same call may be reported only once in every three contacts, unless the logged station is a new multiplier. Scoring is the same as above.

Awards: Certificates to the three leading stations in each overseas country, both transmitting and SWL.

Include a summary sheet with a list of prefixes worked, station description, the usual signed declaration, and your name and address in block letters.

Logs must be received by December 31st. This year they go to: RSGB HF Contests Comm., c/o J. Bazley, G3HCT, "Brooklands" Ullenhall, Solihull, Warks. B95 5NW, England.

Rhode Island QSO Party

1700Z Sat. to 0500Z Sun., Oct. 19–20
1300Z Sun. to 0100Z Mon., Oct. 20–21

This one is again being sponsored by the East Bay AWA (WA1YPN). The same station may be worked on each band and each mode. RI stations may contact other RI stations for QSO points.

Exchange: RS(T) and QTH. City or town for RI; state, province, or DX country for others.

Scoring: Phone QSOs are worth 2 points, CW 3 points, and Novice/Tech. 5 points.

RI stations multiply total QSO points by the number of states, VE provinces, and DX countries worked. Others by the different RI cities and towns worked for their final score (39 cities and towns).

Frequencies: CW—1810, 3550, 3710, 7050, 7110, 14060, 21050, 21110, 28050, 28110. Phone—3900, 7250, 14300, 21360, 28600, 50110, 144.2 and 146.52. (Use of FM simplex is encouraged. No repeaters.)

Awards: Certificates to the top-scoring single operator station in each RI county, and each state, province, and country. The top-scoring Novice/Tech. in RI and out of state will also be rewarded, as will the winning RI multi-operator station.

Include a summary sheet with your entry showing the scoring and other essential information, and an SASE for a copy of the results.

Mailing deadline is November 30th to: East Bay AWA Inc., P.O. Box 392, Warren, RI 02885.

Scouts Jamboree On The Air

Starts: 0001 Local Time Sat., Oct. 19
Ends: 2359 Local Time Sun., Oct. 20

This is the 28th annual Jamboree sponsored by the World Bureau of Scouts. Activity is world wide and includes not only Scout units, but Girl Scouts and Guides, too. This is not a contest, but an opportunity for Scouts or anyone interested in Scouting to get together on the air and exchange greetings. Amateurs can invite members of Scout units or individuals to visit their stations or clubs and see how ham radio operates.

No specific exchange, no scoring, and no logs are required. However, participating post-card-size certificates issued by the World Scout Bureau are available. They may be requested before the JOTA weekend for distribution and included with your QSL's of JOTA contacts. Send a large s.a.s.e. to: Jamboree on the Air, 1325 Walnut Hill, Irving, TX 75062; 22¢ postage for 10 cards, 17¢ for each additional 8.

Suggested Frequencies: Phone—3940, 7290, 14290, 21360, 28990. CW—3590, 7030, 14070, 21140, 28190. Also Novice bands, SSTV, and RTTY.

I suggest you write to W2GND for additional details. Stateside participants send reports to Harry A. Harchar, W2GND, 216 Maxwell Ave., Hightstown, NJ 08520.

CQ World-Wide DX Contest

Phone: Oct. 26–27 CW: Nov. 23–24
0000Z Saturday to 2400Z Sunday

Complete rules were published in last month's issue and are the same as those used last year. There have been a few changes and additions in the sponsors of the more than 60 trophies and plaques that will be awarded in the 1985 contest. The Team Contesting category has been retained and will be given another year trial.

You are again reminded to study the disqualification clause. Penalties have been clearly defined for taking credit for duplicate contacts. You may not only risk a deduction in your score, but also possible disqualification, especially if you were cited in last year's contest.

There are other items that might lead to being disqualified—sportmanship and regulation violations. Reading the comments in the phone results last month (USA QRM item) would indicate that there are areas for improvement. The Contest Committee is cognizant of the fact and will be watching those areas in this year's contest.

Note: The double asterisk (**) at the bottom of the rules page should read "Except the Gordon Marshall, W6RR African Award."

Repeating the deadline, all entries must be postmarked NO LATER than December 1, 1985 for the phone section and January 15, 1986 for the CW section. An extension may be given if requested in writing.

Again this year all logs must be sent directly to: CQ World-Wide DX Contest, 76 North Broadway, Hicksville, NY 11801 U.S.A. Be sure to indicate Phone or CW on the envelope.

Propagation

a monthly feature by
GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Contest Special

The 1985 CQ World-Wide DX Contest will be held on the following dates:

October 26–27—Phone Section
November 23–24—CW Section

Continuing with the practice of the past 35 years, this month's propagation column is devoted to special forecasts for the contest periods, both phone and CW.

Rapidly Decreasing Solar Activity

The present cycle continues to decline rapidly towards its eventual end. The *Royal Observatory of Belgium,* the world's official record keeper of sunspot data, reports a mean sunspot number of 24 for June 1985. This results in a smoothed sunspot number of 21 centered on December 1984. This is a drop of four numbers in a one-month period. A smoothed sunspot number on the order of 14 is forecast for October 1985. This corresponds to a 10.7 cm solar flux level of approximately 80.

The level of solar activity expected during October is the lowest to be forecast for a CQ World-Wide DX Contest since 1964, although activity during the 1976 contest period was almost as low. By comparison, in 1979, when the present cycle was enjoying peak activity, the level during the contest period was between 158 and 162. During last year's contest period the cycle stood at the 29 mark in October and at 25 in November.

Statistically, this means that general DX contest conditions, particularly on the *10, 15,* and *20* meter bands, are expected to be at their poorest level in 21 years. But don't despair. The ionosphere, although weaker, is not going to disappear. There should still be plenty of world-wide DX to be worked, but it's going to require more skill and patience to do it. While conditions are expected to worsen considerably on *10* and *15* meters, *20* meters should continue to be a world-wide DX band during the daylight hours, and nighttime DX openings on *40, 80,* and *160* meters may actually improve a bit when compared to previous years of higher solar activity.

While the expected decline in solar activity and the corresponding degradation of HF propagation conditions can rightfully be greeted with jeers, moans, and groans by DXers, it is part of the amateur radio challenge, and it is what makes amateur radio so interesting. If you plan to participate in the 1985 DX contest, the DX propagation charts and other information appearing in this month's column are designed to help you stay "sharp," and to make use of the ionosphere for piling up as many contest points as possible, despite the decline in solar activity.

11307 Clara Street, Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for October 1985

	Expected Signal Quality			
Propagation Index	(4)	(3)	(2)	(1)
Above Normal: 4, 9, 31	A	A	B	C
High Normal: 5, 8, 15, 21-22	A	B	C	C-D
Low Normal: 3, 6-7, 10, 13-14, 16-17, 20, 23, 25-26, 29-30	A-B	B-C	C-D	D-E
Below Normal: 2, 11-12, 18-19, 24, 27-28	B-C	C-D	D-E	E
Disturbed: None	C-E	D-E	E	E

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9.**

B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. **Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.**
2. **With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be poor to nil (D-E) on the 1st, fair to poor (C-D) on the 2nd, good to fair (B-C) on the 3rd, excellent (A) on the 4th, etc. Above normal conditions are expected for the WWDX Contest on the 26th, dropping to below normal on the 27th.**

General Conditions, Band By Band

The following is a band-by-band summary of DX propagation conditions normally expected from mid-October through mid-December, and entered on the contest periods.

10 Meters: With the bottom of the present sunspot cycle slowly approaching, very few DX openings are expected on this band. During High or Above Normal conditions look for some openings towards Africa before noon, towards Central and South America from a few hours before until a few hours after noon, and towards the South Pacific during the afternoon.

15 Meters: Although DX conditions are not expected to be as good as last year, *15* meters should be a fairly good band during most of daylight hours. When conditions are Normal, the band should open to many areas of the world from shortly after sunrise through the late afternoon. Signals from Europe and Africa should peak an hour or two before noon, while signals from Central and South America, the Far East, and the South Pacific should peak during the late afternoon. During Below Normal or Disturbed conditions, *15* meter openings will be spotty and of very short duration, if possible at all.

20 Meters: This is again expected to be the "backbone" band during the contest. During Normal conditions good DX openings are expected to almost every corner of the world sometime between sunrise and the early evening hours. Conditions should peak for a few hours after sunrise and again during the late afternoon and early evening. During these peak periods, *20* meters should be the optimum band for DX, with openings usually characterized by strong signal levels. When conditions are Below Normal, *20* meter openings should be fewer in number, of shorter duration, and with weaker signal levels. In general, however, the band should hold up for some DX openings during all but Disturbed conditions.

40 Meters: The band is expected to open during the late afternoon hours, and remain open for DX to one area of the world or another until shortly after sunrise. Look for openings to Europe and Africa from an hour or so before sundown to about midnight in the MST and PST time zones, and to at least 2 a.m. in the CST and EST zones. Good openings towards Central and South America should be possible throughout most of the hours of darkness. Openings towards the South Pacific and the Far East are expected to peak during a two-hour period before sunrise. During most of the hours of darkness, *40* meters should normally be the optimum band for DX propagation. When conditions are Below Normal or Disturbed, openings will be spotty and considerably fewer in number.

80 Meters: DX propagation conditions are generally at their best on this band during periods of low solar activity. Some fairly good *80* meter DX openings are expected to several areas of the world dur-

ing the hours of darkness and the sunrise period. When propagation conditions are Normal, signal levels should be strong on many openings. Even during Below Normal or Disturbed periods there is a fairly good chance that some DX openings may be possible during the hours of darkness. Expect conditions normally to peak around midnight for openings towards Europe and Africa, after midnight and before sunrise for openings towards Central and South America, and just before sunrise for openings towards the South Pacific and the Far East.

160 Meters: With longer hours of darkness, DX conditions on this band should improve. While DX conditions may not be as good on *40* and *80* meters, look for openings to many areas of the world during the hours of darkness and the sunrise period. Because of power limitations in force on this band in many areas of the world, signals are likely to be weak and noisy, especially on phone. The best time for *160* meter DX is when a path is in *complete* darkness. Within this period conditions often peak just as the sun begins to rise at the *easterly* point on the path. The best forecaster for *160* meter DX (and 40 and 80 meters, as well) is a set of sunrise and sunset tables. For example, if the sun is expected to rise at 0700 GMT in western Europe, then this would be the best time to look for *160* meter openings between western Europe and the USA, plus or minus a half hour. Conditions on *80* meters can often also serve as an indicator for *160* meter openings. The band will often open at the same *80* meters seems to peak on a particular path. With these tips and some patience, it should be possible to work many DX areas of the world on *160* meters during the contest.

Contest Work Plans

The DX Propagation Charts on the following pages show the times when each amateur band from *10* through *160* meters is expected to open for DX from the United States to the major areas of the world. Instructions for the proper use of these charts are given elsewhere in this column.

The information contained in the charts can easily be reorganized into more convenient types of operational work plans, or schedules, which can serve as valuable propagation guides during the contest. Experience gained during previous contests has shown that such plans can be extremely useful in piling up contacts and points with a minimum of wasted time.

Table I is an example of one of several types of plans that can be devised. It shows, for each three-hour period throughout the day, the areas of the world to which *20* meter propagation conditions are expected to be optimum. Only those openings shown in the charts with a propagation index of (2) or higher were used in compiling this plan.

Time PST	Areas to which openings should be optimum
00–03	No openings expected with a propagation index of (2) or higher. Some (1) openings should be possible to South America, South Pacific, New Zealand, and Australasia, but this means conditions should be High Normal or better. This is a good time to catch up on some sleep.
03–06	About the same as the previous block.
06–09	Should open in just about every direction: Europe, North Africa, Eastern Mediterranean and Middle East, most of Asia and the Far East, Pacific Islands, New Zealand, Australasia, the Caribbean, Central America, and most of South America. This is the period in which to rack up points.
09–12	About the same as previous period, but signals getting weaker and openings falling off.
12–15	Western and southern Europe, most of Africa, most of the Caribbean, Central America, and the northern countries of South America.
15–18	All of the Caribbean, Central America and South America, most of Africa, the Pacific Islands and New Zealand, the Far East.
18–21	Another peak period, and a good time in which to increase scores. Most of Asia including the Far East; the Pacific Islands, New Zealand, and Australasia; Caribbean, Central and South America, but falling off; Antarctica.
21–00	South Pacific, New Zealand and Australasia, much of South America, Antarctica. A propagation index (1) opening to Europe and Africa.

Table I– Sample 20 meter operating schedule for a Western USA QTH.

A western USA QTH has been chosen for this example, but similar plans can be devised for other locations, for other bands or for multi-band operation, and for other time spans.

Radio Storms

The forecasts discussed in this column are based on *normal* propagation conditions expected with a sunspot level of approximately 14. If actual conditions during the contest turn out to be *above normal*, DX openings on *10, 15,* and *20* meters are likely to be somewhat better than shown in the charts. On the other hand, if a radio storm should develop, with accompanying below normal or disturbed HF propagation conditions, fewer openings will take place on these bands. During radio storms, propagation conditions on *40, 80,* and *160* meters generally also become erratic, with poorer openings during certain types of storms and improved openings during other types.

If a radio storm should develop during the contest, circuits passing through or near polar regions will probably become weak, fade considerably, or may even black out entirely, depending upon the severity and duration of the storm. During certain storms, while east-west propagation may become poorer, north-south openings may improve.

If a storm should occur, concentrate on working the higher frequency bands and the paths to the northeast, north, and northwest during the daylight hours, and the lower bands and the paths to the east, south, and west during the evening and early morning hours.

A Last Minute Forecast made at press time for the phone section of the contest appears at the beginning of this column. A similar forecast for the CW section will appear in next month's column. For updated geomagnetic and solar data during the contest period, check the National Bureau of Standards Radio Station WWV broadcasts at 18 minutes past each hour. These broadcasts (transmitted simultaneously on 2.5, 5.0. 10.0, 15.0, and 20.0 MHz) contain the latest available geomagnetic A and K-figures and the level of 10.7 cm solar flux. They also contain a short-term forecast of geomagnetic and solar conditions given in subjective terms. Table II can be used to convert the geomagnetic and solar data given on the WWV broadcasts into expected HF ionospheric conditions. The hourly forecasts broadcast on WWV along with the latest solar flux and geomagnetic indices, also may be obtained by telephoning 303-497-3235 at any time. This is a service provided by the NOAA Space Environment Services Center, but the call is not toll-free. Direct inquiries to the duty forecaster at the center can also be made 24 hours each day, 7 days a week by calling 303-497-3171 (collect calls will not be accepted).

For example, a solar flux of 82 and an A-index of 9 should result in High Normal conditions, while a solar flux of 77 and a K index of 2.5 would indicate Low Normal conditions.

Do-It-Yourself Forecasting

Besides the WWV transmissions of solar flux and geomagnetic data, there are now available several aids, including software for home computers, which can be used for forecasting conditions and band openings during the 1985 contest.

I personally use the MUFPLOT program on my grandson's Commodore-64 computer for determining band openings. While not as accurate as the more powerful computer programs such as

Geomagnetic Activity	Range K	A	Solar Flux Range 65-80	80-100
Quiet	0–1	0–3	Above Normal	Above Normal
Quiet	1–2	3–7	High Normal	Above Normal–High Normal
Unsettled	2–3	7–15	Low Normal	High Normal
Active	3–4	15–27	Low Normal–Below Normal	Low Normal
Minor Storm	4–5	27–48	Below Normal–Disturbed	Below Normal–Disturbed
Major Storm	5+	48+	Disturbed	Disturbed

Table II– This table can be used to convert the geomagnetic and solar data given on the WWV broadcasts into expected HF ionospheric conditions.

HOW TO USE THE DX PROPAGATION CHARTS

1. Use Chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8 KP4, KG4 and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9 and 0 areas; the Western USA Chart in the 6 and 7 areas, and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 Meters) for a particular DX region, as shown in the left-hand column of the Charts. An * indicates the best time to listen for 160 meter openings.

3. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:
(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days
Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

4. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. Appropriate *daylight* time is used, *not* GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts c.w., or 1 kw, p.e.p. on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level for each 10 dB loss, it will lower by one level.

6. Propagation data contained in the Charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept of Commerce. Boulder, Colorado, 80302.

October 15–December 15, 1985
Time Zone: EDT (24-Hour Time)
EASTERN USA TO:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	09-11 (1)	08-09 (1) 09-11 (3) 11-12 (2) 12-13 (1)	06-07 (1) 07-08 (2) 08-09 (4) 09-11 (3) 11-13 (4) 13-14 (3) 14-15 (2) 15-17 (1)	16-17 (1) 17-18 (2) 18-20 (3) 20-02 (2) 02-03 (3) 03-04 (2) 04-05 (1) 19-21 (1)* 21-23 (2)* 23-02 (3)* 02-03 (2)* 03-04 (1)*
Northern Europe & European USSR	09-11 (1)	08-09 (1) 09-10 (2) 10-11 (1)	06-07 (1) 07-10 (3) 10-13 (2) 13-15 (1)	17-19 (1) 19-22 (2) 22-01 (1) 01-03 (2) 03-04 (1) 19-21 (1)* 21-01 (2)* 01-03 (1)*
Eastern Mediterranean & Middle East	08-10 (1)	08-09 (1) 09-11 (2) 11-12 (1)	06-10 (1) 10-12 (2) 12-15 (3) 15-16 (2) 16-18 (1)	18-20 (1) 20-00 (2) 00-02 (1) 20-22 (1)* 22-00 (2)* 00-01 (1)*
Western Africa	11-14 (1)	08-10 (1) 10-12 (2) 12-13 (3) 13-15 (4) 15-16 (2) 16-17 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-16 (3) 16-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	18-20 (1) 20-02 (2) 02-03 (1) 20-22 (1)* 22-01 (3)* 01-02 (1)*
Eastern & Central Africa	10-13 (1)	08-12 (1) 12-14 (2) 14-15 (1)	07-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	20-01 (1) 22-00 (1)*
Southern Africa	10-12 (1)	08-10 (1) 10-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	07-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1) 22-00 (1)	18-19 (1) 19-22 (2) 22-23 (1) 19-22 (1)*
Central & South Asia	NIL	09-11 (1) 17-19 (1)	07-08 (1) 08-10 (2) 10-12 (1) 19-21 (1)	05-07 (1) 18-21 (1) 05-07 (1)* 18-20 (1)*
Southeast Asia	NIL	17-19 (1)	07-08 (1) 08-10 (2) 10-13 (1) 18-21 (1)	05-07 (1) 18-20 (1) 05-07 (1)*
Far East	NIL	16-17 (1) 17-18 (2) 18-19 (1)	07-08 (1) 08-10 (2) 10-11 (1) 16-19 (1) 19-21 (2) 21-22 (1)	04-08 (1) 17-19 (1) 05-07 (1)* 17-18 (1)*
South Pacific & New Zealand	12-16 (1)	12-14 (1) 14-15 (2) 15-16 (3) 16-18 (2) 18-19 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-11 (2) 11-17 (1) 17-18 (2) 18-20 (3) 20-22 (2) 22-01 (1)	23-00 (1) 00-02 (2) 02-06 (3) 06-08 (2) 08-09 (1) 02-04 (1)* 04-06 (2)* 06-07 (1)*
Australasia	14-16 (1)	10-15 (1) 15-16 (2) 16-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-09 (2) 09-15 (1) 15-17 (2) 17-20 (1) 20-23 (2) 23-01 (1)	02-05 (1) 05-07 (2) 07-08 (1) 04-05 (1)* 05-07 (2)* 07-08 (1)*
Caribbean, Central America & Northern Countries of South America	08-09 (1) 09-13 (2) 13-15 (1)	07-08 (1) 08-09 (2) 09-14 (3) 14-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	00-06 (1) 06-07 (2) 07-09 (4) 09-11 (3) 11-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 22-00 (2)	18-19 (1) 19-21 (3) 21-03 (4) 03-05 (3) 05-06 (2) 06-07 (1) 19-21 (1)* 21-01 (2)* 01-04 (3)* 04-05 (2)* 05-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	10-15 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-14 (2) 14-16 (4) 16-17 (2) 17-18 (1)	06-07 (1) 07-09 (3) 09-10 (2) 10-14 (1) 14-16 (2) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 22-00 (2) 00-02 (1)	20-22 (1) 22-04 (2) 04-06 (1) 21-23 (1)* 23-03 (2)* 03-04 (1)*

McMurdo Sound, Antarctica	NIL	08-10 (1) 13-15 (1) 15-16 (2) 16-17 (1)	16-18 (1) 18-19 (2) 19-21 (3) 21-23 (2) 23-00 (1) 06-08 (1)	03-06 (1)

Time Zones: CST & MST (24-Hour Time) CENTRAL USA TO:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	08-10 (1)	08-09 (1) 09-12 (2) 12-13 (1)	06-07 (1) 07-09 (2) 09-11 (1) 11-12 (2) 12-14 (3) 14-16 (2) 16-17 (1)	17-18 (1) 18-20 (3) 20-22 (2) 22-00 (1) 00-02 (2) 02-03 (1) 18-20 (1)* 20-00 (2)* 00-02 (1)*
Northern Europe & European USSR	08-10 (1)	08-11 (1)	06-07 (1) 07-12 (2) 12-14 (1)	18-19 (1) 19-21 (2) 21-23 (1) 23-00 (2) 00-01 (1) 19-00 (1)*
Eastern Mediterranean & Middle East	08-10 (1)	09-11 (1)	06-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-17 (1)	18-20 (1) 20-23 (2) 23-00 (1) 20-23 (1)*
Western Africa	10-13 (1)	07-10 (1) 10-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	06-12 (1) 12-14 (2) 14-15 (3) 15-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	18-19 (1) 19-23 (2) 23-00 (1) 19-23 (1)*
Eastern & Central Africa	09-12 (1)	08-11 (1) 11-13 (2) 13-14 (1)	07-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	20-00 (1) 21-23 (1)*
Southern Africa	09-12 (1)	07-10 (1) 10-11 (2) 11-12 (3) 12-13 (2) 13-14 (1)	21-23 (1) 07-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	18-19 (1) 19-22 (2) 22-23 (1) 19-22 (1)*
Central & South Asia	Nil	17-19 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-18 (1) 18-20 (2) 20-21 (1)	05-08 (1) 18-20 (1) 05-07 (1)* 18-20 (1)*
Southeast Asia	Nil	14-16 (1) 16-18 (2) 18-19 (1)	07-08 (1) 08-10 (2) 10-14 (1) 18-19 (1) 19-21 (2) 21-22 (1)	04-07 (1) 17-19 (1) 05-07 (1)*
Far East	16-18 (1)	15-16 (1) 16-18 (2) 18-19 (1)	07-08 (1) 08-10 (3) 10-11 (2) 11-12 (1) 16-18 (1) 18-20 (2) 20-22 (1)	01-02 (1) 02-04 (2) 04-06 (1) 06-08 (2) 08-09 (1) 02-03 (1)* 03-05 (2)* 05-07 (1)*
South Pacific & New Zealand	12-17 (1)	10-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	06-07 (1) 07-09 (3) 09-12 (2) 12-17 (1) 17-18 (2) 18-20 (3) 20-22 (2) 22-00 (1)	23-01 (1) 01-02 (2) 02-07 (3) 07-08 (2) 08-09 (1) 00-02 (1)* 02-07 (2)* 07-08 (1)*
Australasia	14-17 (1)	10-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	05-07 (1) 07-08 (2) 08-10 (2) 10-11 (2) 11-15 (1) 15-17 (2) 17-19 (1) 19-20 (2) 20-22 (3) 22-00 (2) 00-02 (1)	02-04 (1) 04-08 (2) 08-09 (1) 03-04 (1)* 04-07 (2)* 07-08 (1)*
Caribbean, Central America & Northern Countries of South America	08-09 (1) 09-14 (2) 14-16 (1)	07-08 (1) 08-09 (2) 09-14 (3) 14-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	00-06 (1) 06-07 (2) 07-09 (4) 09-11 (3) 11-13 (2) 13-15 (3) 15-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 22-00 (2)	18-19 (1) 19-20 (2) 20-21 (3) 21-03 (4) 03-05 (3) 05-07 (2) 07-08 (1) 19-21 (1)* 21-00 (2)* 00-03 (3)* 03-05 (2)* 05-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	09-15 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-15 (3) 15-16 (4) 16-17 (2) 17-18 (1)	00-07 (1) 07-09 (2) 09-14 (1) 14-16 (2) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 22-00 (2)	19-21 (1) 21-01 (2) 01-03 (1) 03-05 (2) 05-06 (1) 21-23 (1)* 23-01 (2)* 01-03 (1)*
McMurdo Sound, Antarctica	Nil	07-09 (1) 13-15 (1) 15-17 (2) 17-18 (1)	06-08 (1) 15-17 (1) 17-19 (2) 19-22 (3) 22-00 (2) 00-01 (1)	03-06 (1)

Time Zone: PST (24-Hour Time) WESTERN USA TO:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	08-10 (1)	07-08 (1) 08-10 (2) 10-12 (1)	06-07 (1) 07-09 (2) 09-10 (1) 10-14 (2) 14-16 (1) 23-01 (1)	18-20 (1) 20-22 (2) 22-00 (1) 19-23 (1)*
Northern Europe & European USSR	Nil	07-10 (1)	06-07 (1) 07-11 (2) 11-13 (1) 23-01 (1)	21-00 (1) 21-23 (1)*
Eastern Mediterranean & Middle East	Nil	07-10 (1)	06-07 (1) 07-09 (2) 09-11 (1) 11-13 (2) 13-15 (1) 21-23 (1)	18-22 (1) 06-08 (1)
Western Africa	09-11 (1)	08-10 (1) 10-11 (2) 11-12 (3) 12-13 (2) 13-14 (1)	07-10 (1) 10-14 (2) 14-16 (3) 16-17 (2) 17-18 (1) 22-00 (1)	18-23 (1) 19-22 (1)*
Eastern & Central Africa	Nil	09-12 (1)	06-09 (1) 11-13 (1) 13-16 (2) 16-18 (1) 21-23 (1)	18-21 (1) 06-08 (1)
Southern Africa	08-12 (1)	08-10 (1) 10-13 (2) 13-14 (1)	07-09 (1) 11-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1) 23-01 (1)	18-19 (1) 19-20 (2) 20-21 (1) 06-08 (1) 18-20 (1)*
Central & South Asia	NIL	17-19 (1)	07-08 (1) 08-09 (2) 09-11 (1) 16-17 (1) 17-18 (2) 18-19 (1)	04-06 (1) 06-08 (2) 08-09 (1) 05-07 (1)*
Southeast Asia	15-17 (1)	14-15 (1) 15-17 (2) 17-18 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-20 (2) 20-22 (1)	02-03 (1) 03-06 (2) 06-08 (1) 03-07 (1)*
Far East	14-16 (1)	13-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	07-08 (1) 08-10 (3) 10-12 (2) 12-16 (1) 16-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	22-00 (1) 00-02 (2) 02-07 (3) 07-08 (2) 08-09 (1) 23-01 (1)* 01-05 (2)* 05-07 (1)*
South Pacific & New Zealand	12-14 (1) 14-16 (2) 16-17 (1)	09-12 (1) 12-15 (2) 15-17 (4) 17-18 (2) 18-19 (1)	04-07 (1) 07-09 (3) 09-12 (2) 12-16 (1) 16-17 (2) 17-18 (3) 18-20 (4) 20-22 (2) 22-02 (1) 02-04 (2)	21-22 (1) 22-05 (3) 05-08 (2) 08-09 (1) 22-00 (1)* 00-06 (2)* 06-07 (1)*
Australasia	15-17 (1)	11-12 (1) 12-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	12-17 (1) 17-19 (2) 19-21 (3) 21-22 (2) 22-03 (1) 03-05 (2) 05-07 (1) 07-10 (3) 10-12 (2)	02-03 (1) 03-04 (2) 04-07 (3) 07-08 (2) 08-09 (1) 03-04 (1)* 04-07 (2)* 07-08 (1)*
Caribbean, Central America & Northern Countries of South America	08-10 (1) 10-14 (2) 14-15 (1)	07-08 (1) 08-11 (2) 11-13 (3) 13-15 (4) 15-16 (2) 16-17 (1)	00-05 (1) 05-06 (2) 06-08 (3) 08-09 (4) 09-10 (3) 10-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-22 (1) 22-00 (2)	18-19 (1) 19-20 (2) 20-03 (3) 03-04 (2) 04-06 (1) 19-22 (1)* 22-02 (2)* 02-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	09-14 (1)	07-08 (1) 08-09 (2) 09-13 (1) 13-14 (2) 14-15 (4) 15-16 (3) 16-17 (1)	01-06 (1) 06-09 (2) 09-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 22-01 (2)	19-21 (1) 21-03 (2) 03-05 (1) 20-23 (1)* 23-01 (2)* 01-02 (1)*
McMurdo Sound, Antarctica	Nil	08-10 (1) 13-15 (1) 15-16 (2) 16-18 (1)	07-09 (1) 17-19 (1) 19-20 (2) 20-22 (3) 22-00 (2) 00-02 (1)	23-02 (1) 02-05 (2) 05-06 (1) 02-05 (1)*

** Indicates best time to listen for 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.*

IONCAP, which are available professionally, MUFPLOT does an acceptable job on either Commodore or Apple computers. The latest version of the program will print out in standard format highest usable frequency, maximum usable frequency, and lowest usable frequency for any path over a 24-hour period. The program also prints out beam heading and distance, and can also be used for obtaining sunrise and sunset data, etc. The only input needed, besides path terminals and date, is solar flux level. Since solar flux values can be obtained from WWV, the MUFPLOT program is to a very large degree a "real time" propagation prediction method. For pricing, availability, and full information write directly to Base (2) Systems, 2534 Nebraska Street, Saginaw, MI 48610. Check the Ham Shop section in this issue of *CQ* for other propagation programs that may be available. Programs such as MUFPLOT can be of tremendous help during the DX contest.

Another propagation aid that I use is the *DX Edge,* which is available from Xantek, Inc., P.O. Box 834, Madison Sq. Station, New York, NY 10159. It is a slide-rule-type device which allows you to determine quickly and easily those areas of the world that are in daylight, darkness, or twilight at any given time of day and for any month of the year. It is great for determining sunrise and sunset times at a glance, for locating the terminator, and for predicting long-path and gray-line openings. The *DX Edge* has recently been modified to also make it possible to determine great-circle bearings. I also find it useful for determining local time anywhere in the world.

The *DX Edge* consists of a slide-rule-type carrier and a set of monthly transparent overlays. Imprinted on the carrier is a unique double map of the world showing the 40 *CQ* DX zones and many country prefixes. The overlays slide along the carrier, giving a clear, instant visual picture of daylight-darkness conditions. Easy-to-understand instructions come with the *DX Edge* and explain how to use the instrument for determining the best times to look for DX openings on the HF bands. It should be an invaluable aid during DX contests. Pricing and other information can be obtained directly from Xantex.

If you do not already have a copy of the *Shortwave Propagation Handbook* by myself and Theodore J. Cohen, N4XX, then you might want to get one to read *before* the contest begins. The book continues to be the most popular text for plain, every-day use and understanding of HF radio propagation. It contains propagation information and charts, and guides you through do-it-yourself prediction and forecasting methods. Copies are still available from the *CQ* Book Shop, 76 North Broadway, Hicksville, NY 11801 for $8.95 postpaid (plus $2.00 shipping and handling).

Lee Wical, KH6BZF, puts out an excellent weekly newsletter full of interesting propagation information, and containing advanced forecasts of HF and VHF ionospheric openings. Write directly to KH6BZF at 45-601 Luluku Road, CRT #4411, Kane'Ohe, Hawaii 96744-1854 for more complete details, availability, and pricing.

VHF Ionospheric Openings

While the *CQ* DX Contest does not include the VHF bands, some interesting ionospheric activity is likely to occur on these bands during October.

Some fairly good meteor-scatter-type openings should be possible on the VHF bands around October 20th, when the two-day *Orionids* meteor shower is expected to begin. This should be a major shower, with a maximum hourly rate of at least 25 meteors.

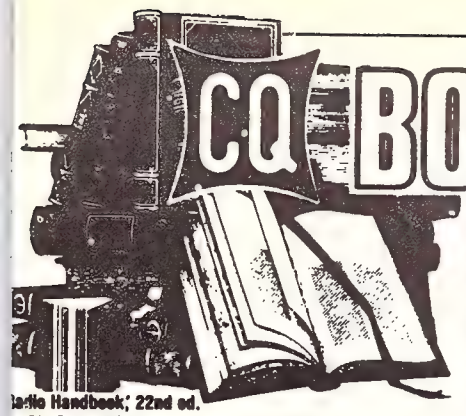
Auroral activity usually increases during October, and some corresponding auroral-scatter-type and sporadic-*E* VHF openings can be expected during periods of such activity. The best days to check are those which are expected to be either Below Normal or Disturbed on the HF bands. See the Last Minute Forecast at the beginning of this column for the days in October that are forecast to be in these categories.

CW Contest Forecast

This month's DX Propagation Charts are valid for both the phone and the CW sections of the contest. Be sure to keep them handy for use during next month's CW section as well. Short-Skip Propagation Charts for use during October appeared in last month's column.

Experience from the past 34 contest years has shown that DX contests are excellent periods in which to test the accuracy of prediction and forecast methods used in this column. Contests generate a large amount of activity in every corner of the world and on all HF bands. Previous results and observations have helped considerably in improving the accuracy of this column. Comments concerning the 1985 contest and the accuracy of these forecasts and predictions would be appreciated, and should be sent directly to W3ASK at P.O. Box 1714, Silver Spring, MD 20902. *Good luck in the contest!*

73, George, W3ASK



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Antennas & Accessories

a monthly feature by
KARL T. THURBER, JR., W8FX

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

Reader Report

This month columnist W8FX opens the mailbag again for some more interesting comments on the popular G5RV antenna. He also looks at a very practical antenna accessory, as well as some new and useful hamshack software. Stay with us.
—K2EEK

Last month we wrapped up the six-part Notebook series. In the final article of the series we examined the "bottom line" of antenna performance parameters, primarily from the standpoint of the parameters themselves, but we also considered a number of measurement aspects. In addition, we took a look at several antenna-related products, and noted some especially interesting hamshack reading material.

In this month's Antennas column we'll focus on publicly answering some of our reader mail. We will begin by sampling some of the many letters we received regarding our treatment of the G5RV antenna in the March '85 column, and our call for comments on this increasingly popular antenna's performance. We'll then highlight a number of other mailbag items from readers concerning both previous columns and news items of interest. We'll also take a look at a most useful antenna measurement accessory, the antenna noise bridge (ANB), and then in particular W8URR's Tennatest bridge. Closing out the column for the month, we'll take our customary look at what's new in the world of software for the hamshack. Let's kick off this time with a review of letters received on the G5RV antenna.

The G5RV: They Like It!

We have discussed the G5RV antenna several times in the column, most recently being our coverage in the March issue. To review, the G5RV design was proposed by Louis Varney, G5RV, several years back, and it's coming back "in" as a very simple, inexpensive, and easy-to-install multiband dipole. Essentially, the G5RV is a 102 foot wire dipole fed in the center with a specific length of twinlead or openwire line.

Several versions of the 80–10 meter G5RV have been developed, both of which use the same length of flattop. One version (the one I'm partial to) uses a 33 foot length of openwire line (or about 29 feet of twinlead) connected directly to a transmatch. A second version uses the same 33 or 29-foot length of balanced transmission line, but this is connected, in turn, to a 68 foot or longer section of coax. The coax, on which the SWR may run rather high, is also routed through a transmatch, required to reduce the line's end impedance to a reasonable-enough value to make the transmitter happy. This configuration was shown as fig. 3 on page 64 of the March issue.

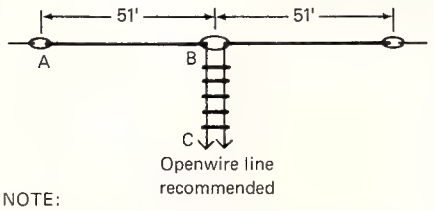


Fig. 1– The G5RV antenna. This sketch shows the G5RV as fed with openwire line. As pointed out by Fred Bonavita, W5QJM, in the text of this month's column, the trick to obtaining even performance across all bands lies in optimizing the feedline length. The idea is to avoid antenna currents on the transmission line by varying its length in relation to the band(s) and one side of the antenna. See Fred's letter, which shows the importance of the dimension AB + BC.

In that issue, we asked if we had any G5RV users in the *CQ* audience. As I found out, we certainly do have some G5RVers out there, and we received a half-dozen letters in just a few days after the issue hit the newsstands. The performance verdict was almost unanimous: this antenna works, and it works well.

Typical of the letters received in praise of the antenna's performance was that from Mike Schrowang, KC9YN. Excerpting from Mike's letter:

"I am a user of the G5RV antenna and am very pleased with the results. It is very easy to assemble, and I recommend it to hams who might be plagued with space problems, but want multiband performance . . . it also makes a good Novice antenna which can built by anyone with little or no experience. I haven't used it for 160 meters because I'm using a centerfed halfwave dipole [on that band], but I have worked stations on the 'top band' that have done what you suggested [tying the feeder wires together and operating the antenna against ground as a random-length, top-loaded vertical—ed.].

"My antenna uses the 102 foot flattop, and I use good-quality 300 ohm twinlead with a length of 29.5 feet. I look forward to hearing more on the G5RV in your articles, and I'm sure you will get lots of mail on it."

How true! While we received numerous letters on the G5RV, probably the most enlightening letter was received from Fred Bonavita, W5QJM, who has experimented a good deal with G5RV. It's instructive to reprint most of Fred's letter:

"You bet there are some G5RV users and lovers out here in radioland. I have been using a G5RV in modified form for many years, and would not return to any other type of wire antenna. My experimenting with the G5RV and the work of others has brought me to the modified form of that antenna, and your readers might be interested in the findings.

"First off, openwire line is the best for feeders. It is available from Kilo-Tec at about $15 per 100 feet—compare that with the price of coax. This is 450 ohm line with spreaders spaced every 6 inches for better performance. If 450 ohm openwire line is not desired, the next best is 450 ohm ribbon line (available from Texas Towers, Kilo-Tec, and others at about the same price). This comes with 'windows' cut in it to ease the strain on the line in high winds, but long runs can flap around vigorously. The balanced line to avoid, however, is 300 ohm TV-type twinlead. This stuff will change impedance when it gets wet, and it is to be avoided for permanent installations, if possible."

Fred continues: "While I agree with the 51 foot length for the legs of the G5RV antenna, I disagree with the lengths of the feeders given in the March column. It's important to avoid resonances in the feedline.

"I had trouble getting a G5RV to load properly using virtually the same dimensions given in your March column and combining the balanced and coax line. Once I used Myers' formula for the correct ratio between the feedlines and one side of the flattop [Robert M. Myers, W1XT, *Practical Antennas for the Radio Amateur,* SCELBI Publications, 1979, p. 39], it played like an accordion. I also did away with the coax."

For those who don't have W1XT's book, Fred explains that "... the secret is

317 Poplar Drive, Millbrook, AL 36054

avoiding antenna currents on the transmission line by varying its length in relation to the bands(s) and one side of the antenna. I cut the feeder so that its length, plus the 51 feet [of flattop], would not be an even multiple of 16 feet for 80, 40, 20, or 10 meters, and would not be an even multiple of 22 feet for 15 meters."

Looking at fig. 1, drawn from Fred's sketch, with dimension AB = 51: ". . . If we make BC = 45, then AB + BC = 96. When divided by 16, this gives us an answer of 6.0, a no-no. Dividing that by 22 is 4.36, which is slightly more acceptable. Change the feeder length, BC, to, say, 53. We now have 51 + 53 = 104. That divided by 16 equals 6.5, a good answer. That figure (104) divided by 22 equals 4.73, which is okay, but not an optimum number for 15 meter operation."

Fred summarizes: "The idea here is to try to get a combination of AB and BC which, when divided by 16 and 22, will produce an answer as close as possible to a 'point-5' response (such as 5.5, 8.4, 3.6, etc.), and as far as possible from a 'point-0' response (such as 7.0, 4.1, 6.9, etc.). This may require some pruning, but it's not difficult. [Note that] all feedline measurements must be made from the output of the antenna tuner to the center feedpoint 'B' of the antenna. The G5RV can be hung either as a flattop or as an inverted Vee antenna, and it plays well in either configuration."

We thank Fred for his detailed explanation of the interplay of the flattop and the feedline. Alternately, when constructing multiband dipoles, consider retuning the line for antenna currents by selecting a feeder length which, when combined with one-half of the flattop length, does not equal an integral multiple of a half-wavelength. Line lengths of about 27, 40, 58, 76, 96, 110, or 140 feet should do the trick over 3.5–29.7 MHz. Note that the line's velocity factor doesn't play a part in establishing these resonances.

Anthony M. DeFazio, N2EVN, uses the alternate G5RV version that makes use of a length of coax to make the final run to the hamshack. He found happiness with a length of openwire of exactly 35 feet, or if using twinlead, 29.6 feet, as opposed to the lengths we specified (33 and 29 feet, respectively). While N2EVN doesn't specify the exact length of coax he used in his installation, he advises that (1) the coax run should not be less than 68 feet; and (2) the cable should not be routed directly underneath the antenna, but rather run off at a right angle, then into the hamshack. He indicates that with his G5RV sized to the specifications listed above, the SWR on all bands, 10 through 80, was down to 1:1—certainly no mean feat, particularly if this includes 30 meters!

Phil Dendinger, N6FNT, indicated good success with a "half-size" G5RV. Wrote Phil: "I live in a condo and use a half-size version—25 feet, 6 inches of #12 wire on each side of the dipole, and 14 feet, 9 inches of 300 twinlead into 75 ohm coax [coax length not specified]. I run the coax into a Cubic ST-3B antenna tuner and use a Kenwood TS-130S barefoot. I can tune up on 10, 15, and 20 easily, and on 40 [with limited success]."

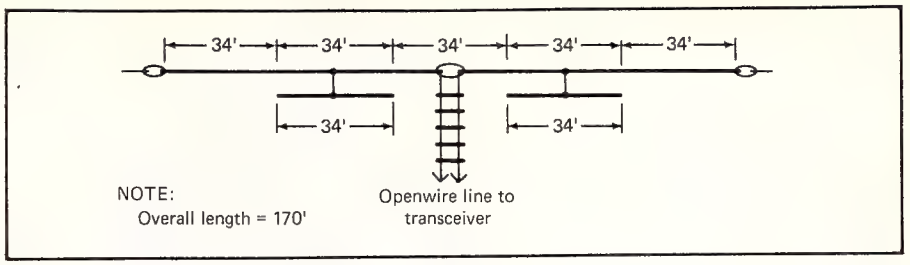


Fig. 2– The W4HIR/KT5X back-to-back J-stub antenna. The interesting multiband HF antenna above was submitted by Carey Brown, W4HIR, on behalf of Fred Maas, KT5X. Back-to-back J-stub arrangement gives a very good account on 15, 20, 40, and 80 meters. Overall antenna length is 170 feet. See text for details. The two stub sections can be held off from the flattop using several homemade spreaders 3 to 4 inches in length, fabricated from plastic plexiglass sheet material.

Phil indicated that he had the antenna outside at first, on top of a one-story garage, bent into a Vee-shape. He later moved the antenna indoors, placing it in the attic, bending it into a "W-shaped" affair, where it still works fine. Clearly, the G5RV antenna is alive and well, as Phil's shack is now graced by a new DXCC award, and he has achieved WAS on 10 meters.

Ken Tinsley, KB6EE, also wrote to describe a similar half-size design. Ken's dimensions were 25 feet, 6 inches for each leg of the flattop, and 17 feet, 6 inches of twinlead, plus 36 feet of coax. Although Ken didn't state, presumably the antenna is used on 40 meters and up.

As we leave the G5RV, at least temporarily, it's interesting to note the almost unanimous opinion of *CQ* readers that the G5RV is an excellent multiband antenna, but the method of feeding and the specific feedline lengths recommended by various users are at considerable variance. This variance is natural with any experimental, compromise multiband antenna, however, and so we're open for more reports on the G5RV!

Into the Mailbox

Carey Brown, W4HIR, submitted the interesting antenna design, shown in fig. 2, that is being used by friend KT5X. No particular name is given to the array by the contributor, though it might be dubbed a "Back-to-Back J-Stub," for the two

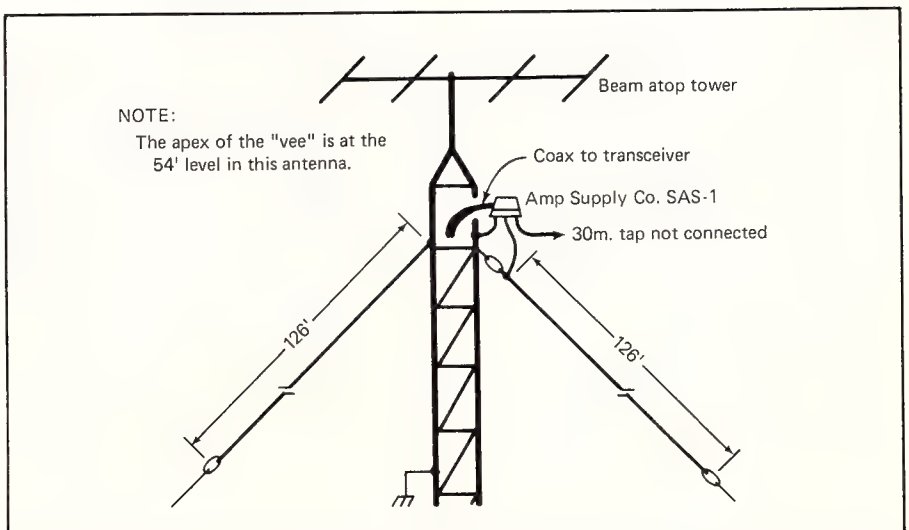
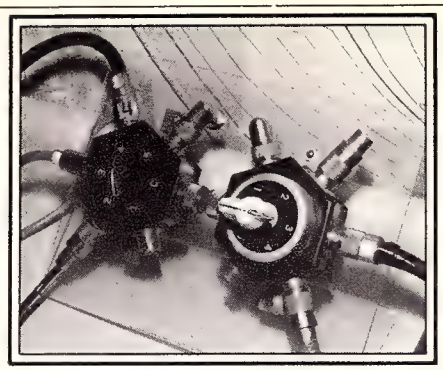


Fig. 3– W1OR piggyback inverted Vee. Gordon Orelli, W1OR, used an Amp Supply Co. SAS-1 matching network (balun) and 252 feet of wire to create a good-performing 160 meter inverted Vee. In his somewhat unorthodox arrangement, the SAS-1 terminal marked "tower/ground" is connected to one of the 126 foot wires and the tower. The other SAS-1 terminal marked "160/80/40 Mtr." is connected to the other 126 foot wire. Since W1OR doesn't use the 30 meter capability of the SAS-1 matcher, the terminal marked "30 Mtr." is not used. Gordon actually modified Amp Supply's SA-4 Sloper antenna system for 160 meter single-band operation in the design he submitted to us. The system as supplied by Amp Supply Co. is designed for 160, 80, 40, and 30 meter operation as a top-fed sloper.

back-to-back J-type radiators which characterize the antenna. The W4HIR/KT5X design is a total of 170 feet in length and uses two 34 foot back-to-back J-sections suspended beneath the flattop. This antenna is similar to the "JF Array" design by Richard R. Schellenbach, W1JF, which was published in *QST* for November 1982.

Carey advises that the antenna works on 80–15 meters. The characteristics, however, are markedly different from band to band. On 80 meters the antenna functions as a "long dipole," while on 40 it's an extended double Zepp with 3.5 dB gain broadside. On 20 the back-to-back J-stubs make it a three-element collinear with about 6 dB bidirectional gain broadside. On 15 there is about 5 dB gain bidirectionally off the ends. As the feedpoint impedance is high, it's best fed with open-wire line of 300–600 ohms impedance, using a wide-range antenna tuner to work into coax within the shack.

W1OR, Gordon Orelli, described a simple "piggyback" 160 meter tower-supported antenna to us a few months ago. The antenna is an inverted Vee with the apex at the 54 foot point on his tower. It's fairly simple: he uses an Amp Supply Co. SAS-1 matching network atop the tower, and feeds it with 50 ohm coax. One side of the network is connected to the tower and to one of the 126 foot lengths of wire, while the other side connects to the other 126 foot wire. Details are shown in fig. 3.



If neatness counts, then Alex, YV5IMF, receives an "A" for this interconnection assembly that allows him to connect up to five rigs to up to five antennas, with the unused antennas and rigs being automatically grounded. (See text.)

Gordon's Vee is a single-band affair; he reports that he had no problem in achieving 160 meter resonance. SWR is fairly flat at 1.5:1 across the band. (The SAS-1 and a trap 160/80/40/30 meter sloper antenna kit, the SA-4—which Gordon modified, since he didn't need to use the other bands—is available from Amp Supply Company, 208 Snow Ave., P.O. Box 147, Raleigh, NC 27602.)

Alex Statzewitch, YV5IMF, sent us a photo of a simple but very neat RF switching assembly that enables him to easily and quickly connect two or more rigs to two or more antennas. He uses two heavy-duty, five-position coaxial switches mounted back-to-back. These are of the grounding type so that the antennas and rigs which are not in use are grounded. In addition to the safety advantages, Alex points out that grounding the unused antennas helps prevent transmitted RF received by the unused antennas from leaking into the standby rigs, to possibly damage "front end" circuitry.

Back in the January 1984 column we described a modified Windom flattop postulated by Bob Grove, WA4PYQ. Bob's design was 134 feet long, fed 44 feet off of one end by a 48.5 foot matching section of 300 ohm twinlead which is at that point connected to a 4:1 balun and coax for the final run into the hamshack. Bob reported good results, with SWRs no higher than 3:1, on 160, 80, 40, 20, 15, and 10 meters.

Rob Wanderer, KT2D, confirms the antenna's performance on 160 and 80 meters, though with high SWR, and adds that it works for him on 30 meters as well, even though mounted quite low. Writes Rob:

"All and all I'm satisfied, but I hope to raise it up come springtime. Presently, the apex is about 17 feet up, and the end of the 44 foot leg is 7.5 feet up and runs pretty much in the clear. The end of the 90 foot leg is up about 8 feet, but runs through trees.

"I have used and tried the antenna on only three bands—160, 80, and 30 me-

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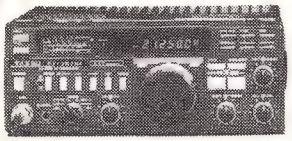

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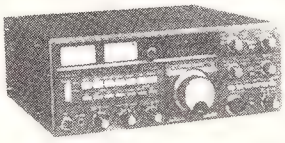

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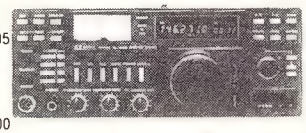

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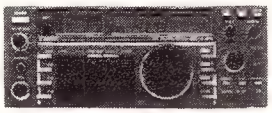

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ters. On 40, 20, 15, and 10, received signal levels are noticeably and consistently poorer on the dipole than on my 14AVQ vertical. Contrary to your article [which indicted that a tuner might not be required—ed.], but perhaps due to the low height and trees, an antenna tuner is required. However, the uncorrected SWR is fairly constant across the bands. For 160, it's 4:1, for 80 it's 3:1.

"The 30 meter band is a different story. Uncorrected SWR is over 10:1, and the best adjustment I can make is 2.5:1 [with the tuner]. Changing the RG-213 cable length between the balun and tuner changes the SWR to a best case of 3:1."

Rob concluded that more experimentation is needed to achieve better performance on 30 meters, though performance on 160 and 80 was good.

In past columns, and most recently in the January 1985 column, we presented some unusual wire antenna designs submitted by Cliff Francis, WØMBP. Cliff is a dedicated antenna experimenter and tinkerer who frequently sends us reports of his experimentation with "broadside curtains," multiple Windoms, and other complicated and often controversial designs.

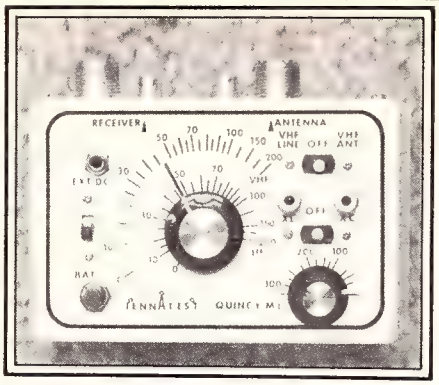
A few months ago Cliff sent us a set of six rather complex designs for a "Combined Effect Antenna," longwires that will resonate on a large number of frequencies between 3 and 30 MHz. These single-wire antennas make use of a number of vertical wire elements suspended from the horizontal flattop. Cliff has found that by carefully choosing the length and arrangement of the vertical elements, multiple resonances are possessed by these dual-polarized antennas, especially useful for MARS work as well as out-of-band shortwave listening.

Cliff's several designs were too numerous to describe in detail and diagram in this month's column, so we suggest that readers who are interested in this type of multi-resonant wire antenna trade notes by corresponding directly with Cliff. Write to him at 325 S. 3rd St., Silsbee, TX 77656. I'm sure that Cliff would appreciate your enclosing an SASE with your letter.

Product Peek

This month we take a look at the antenna noise bridge (ANB), in particular F. Gordon Adams, W8URR's Tennatest. First, let's review some basic facts about the ANB, one of the most useful and popular hamshack instruments.

The ANB is a self-contained package that is useful in adjusting an antenna system to resonance by using a receiver alone; no transmitter energy need be fed to the antenna in order to make measurements on it. The ANB can also be used for a variety of other impedance-measuring and related chores, as we shall see. The ANB can be homebrewed from popular



Shown here is W8URR's Tennatest noise bridge. The unit has a number of useful capabilities, including determination of resonant frequency, VSWR at resonance, resistive impedance, inductive reactance, and capacitive reactance. The VHF model is shown here, and an HF model is also available. (Photo courtesy W8URR)

Handbook or magazine article designs, or commercial units by MFJ, Radiokit, Palomar Engineers, W8URR, or others may be purchased.

The ANB is, in fact, an updated version of earlier instruments, known variously as the Antennascope (described in *CQ* by the late Wilfred Scherer, W2AEF, in 1950), antenna bridge, impedance bridge, antenna null detector, or Z-bridge. The big difference between the ANB and its predecessors is that it includes a built-in broadband noise source. As a result, it doesn't have to be driven by an external signal, such as that from a grid-dip oscillator or transmitter. When the ANB is used with a reliable and stable communications receiver that can tune to the desired frequency, both the antenna resonant frequency and the impedance at resonance can be measured with confidence.

The ANB is an excellent supplement to the SWR bridge, and it allows you to learn a good deal more about your antenna system than does the SWR bridge alone. The ANB is actually a more useful instrument, in that it allows you to determine capacitive and inductive reactance, among other things, and it tells you "which way to go" in adjusting the antenna.

Modern ANBs contain a broadband noise generator and an RF impedance bridge. The known leg of the bridge has a calibrated variable resistor and a calibrated variable capacitor, controlled by a front-panel knob or knobs. The antenna or circuit to be measured is connected to the unknown leg of the bridge, while a receiver, used as a detector, is used to determine frequency.

W8URR's Tennatest ANB, available in both an HF and a VHF version, is designed to simply and easily accomplish most antenna measurements. These include determination of resonant frequency, SWR at resonance, resistive impedance, capacitive and inductive reactance, and electrical feedline length. According to Gordon, the Tennatest unit has a very sharp "noise null," and thus is capable of excellent measurement accuracy. For example, electrical feedline length may be determined with 2 kHz, and accurate determination of feedline velocity factor is possible. Interestingly, the HF model boasts an impedance range of 20 to 300 ohms, and the VHF model features a range of 10 to 200 ohms, but both ranges may be expanded by a factor of four (from 80 to 1200 ohms, and from 40 to 800 ohms, respectively) using a small 4:1 TV-type balun transformer.

The device consists of a noise-generating diode, followed by a wideband, three-stage transistor amplifier, which is transformer coupled to the calibrated bridge circuit. Power is supplied by a 9 volt transistor radio battery or by an external power supply. Connection is made by inserting the noise bridge between the antenna, or other series-resonant circuit, and the receiver. The receiver, which must be able to be tuned to the resonant frequency in order to determine the "null" or decrease in noise, indicates the null point, and the impedance is shown on the bridge's calibrated dial.

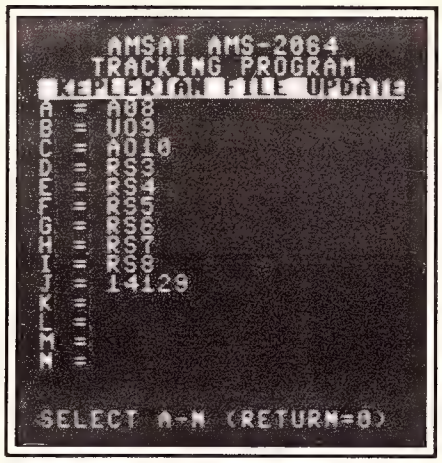
As of this writing, the 1–40 MHz HF model is priced at $39, while the VHF model is priced at $68. Gordon obviously takes pride in his product, as his advertising literature boasts that if you don't feel that the Tennatest outperforms others, it may be returned for a full refund of the purchase price, shipping, and $5 for your trouble! Contact Tennatest, F. Gordon Adams, W8URR, 1025 Wildwood Road, Quincy, MI 49082.

Software Notes

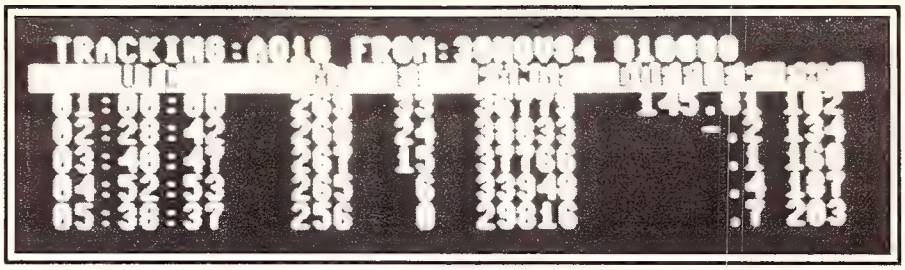
This month we have room to cover just three computer software offerings, but they are all interesting and useful ones. Let's begin with AMSAT.

The Radio Amateur Satellite Corporation (AMSAT) can help you and your computer to "come aboard" the amateur space program. Naturally, whatever antennas you choose to use to "work" one of the OSCAR or other amateur satellites, you must accurately point them toward the satellite, rotating them in both azimuth and elevation. To determine where to point your antennas, you can use a graphical plotting aid, or you can use your personal computer with software available from the AMSAT Software Exchange, Box 27, Washington, DC 20044.

The primary programs offered by AMSAT are versions of the W3IWI orbit prediction program, which tells you just about everything you need to know for determining when to listen and exactly how to position your antennas. Various versions of the program are available to support a wide variety of popular computers. These include the several Radio Shacks and Apples, IBM-PC, TI 99/4, North Star,



AMS-2064 Keplerian file menu. The program, based on the W3IWI orbit prediction program, is available for a dozen or more personal and home computers, and allows the user to make accurate orbital predictions for two-way amateur communications. (W8FX photo)



Partial bracking screen printout derived from the AMSAT AMS-2064 orbital prediction program. (W8FX photo)

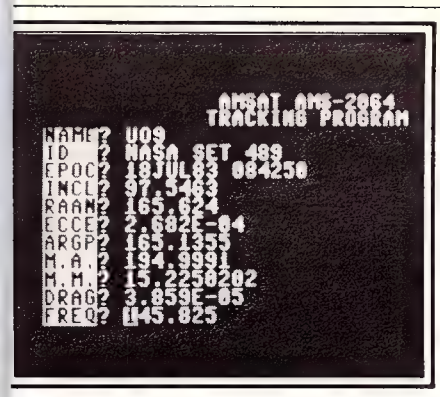
Timex Sinclairs, Atari, Vic-20, Commodore 64, and others. Other programs, such as the KØRZ antenna positioning software for the Apple-II, and Quiktrak for the Commodore 64 and Vic-20, are offered as well. Most, though not all, of the programs are available on either disk or tape and cost between $10 and $20. Contact the AMSAT Software Exchange for more details and their current "program availability notice." (While you're doing this, you might also inquire as to AMSAT membership, certainly worthwhile to help support the amateur space effort and to keep on top of the action.)

Amateurs who are into serious circuit design should be interested in two Commodore 64 offerings from Nth Digit Solutions, 3243 Arlington Avenue No. 195, Riverside, CA 92506. Two electronic program packages are offered. The first is the Circuit Analysis Package, costing $34.95, which includes two powerful programs to analyze the frequency and phase response of practically any circuit configuration. The General Circuit Analysis Program analyzes the amplitude and phase response of a wide variety of circuit configurations of up to 25 nodes and 40 branches. The network elements may be resistors, capacitors, inductors, FET or NPN transistors, or operational amplifiers. The branches entered, as well as the analysis output, may be directed to a printer for hardcopy. Also included in the package is the Ladder Circuit Analysis Program, which will analyze ladder networks of up to 200 branches, computing the amplitude and phase of various transfer functions. This program will handle resistors, inductors, capacitors, transformers, transmission lines, stubs, and other components.

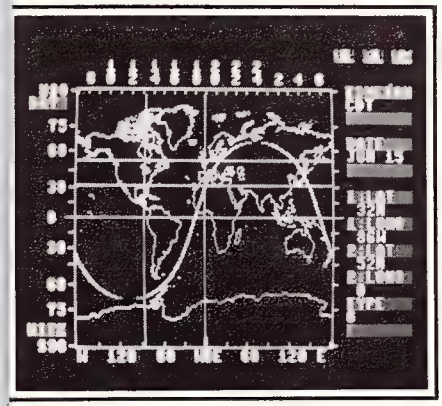
The Circuit Design Package, priced at $24.95, is a menu-driven collection of 13 utility programs used to solve many electronic design problems. These may relate to active and passive filters of various

CIRCLE 16 ON READER SERVICE CARD

CIRCLE 61 ON READER SERVICE CARD



Keplerian file data for the U09 (AMSAT Oscar 9) satellite as displayed by the AMSAT AMS-2064 program for the Vic-20 and Commodore 64. (W8FX photo)



The next few months in your Antennas and Accessories column promise to be packed with interesting material, so stay with us. For example, in an upcoming column we will describe the new Xantek Computerized DX EDGE sunset/sunrise and grayline calculation program for the Commodore 64. (W8FX photo)

types, "L" and "T" attenuators, Ohm's Law, resonance, resistor values, decibels, rectangular-polar conversion, and the like. Both program packages are available only on disk for the Commodore 64. Contact the manufacturer, Nth Digit Solutions, for additional details.

A letter from Milt Webb, WA4FNG, of dataLOG Software, advised us of his line of software for Tandy/Radio Shack Color Computer (CoCo) owners. Milt states that "... there is a lot of software available for the Commodore, Apple, and even for the IBM-PC, and our goal is to make just as much available for CoCo owners."

Milt included a copy of his catalog, which described a number of offerings. These include a comprehensive logging program that can handle up to 1550 QSOs with a two-disk-drive system, a DXCC database, a WAS database, and a disk utility program that is given as a bonus free with every purchase. According to Milt, several new programs are in the works and should be available by the time this column appears. The new programs include an inexpensive Morse keyboard program and COCOMUF, an MUF (Maximum Usable Frequency) prediction routine.

For more information on this line of CoCo software, contact Milt Webb, WA4FNG, at dataLOG Software, P.O. Box 10531, Jacksonville, FL 32247.

Wrapping It Up

Okay, gang, that's all the space we're allowed to use this time. To review, in this month's Antennas column we have provided some followup on the popular G5RV multiband antenna, caught up with some reader mail on a variety of topics, and examined the Tennatest antenna noise bridge. We also highlighted three software offerings of interest to the serious hamshack computerist.

Next time we get together we'll feature several more Antennas topics of timely interest. See you then.

73, Karl, W8FX

DX

NEWS OF COMMUNICATIONS AROUND THE WORLD

I want to be a DXer,
And with DXers stand . . .

One should never doubt the lure of DXing. It is not necessary to search far for proof of this. When did you last come across a DXer who did not repetitively turn the conversation back to DXing no matter how it might have been headed? A couple of months back the lure brought a Local up the hill to seek the exotic delights of DX. He was not the first.

DX always is fascinating, possibly even more so to those whose lives up to now have been blighted by being trapped into rag-chewing, local nets, and old crony nets, and whose yearly highlight has been the outing for Field Day. But one should not confuse the ability to expand one's horizons with the opportunity to work the far places. This Local had come looking for opportunity.

"Tell me about DXing," he commanded, and we told him. Naturally we told him about the morning paths to the Far East and the Indian Ocean, the night paths to South Africa, and the strong signals always out of the vast Pacific. We expounded on the local yachts which head out from the Golden Gate, hook a left turn, and are soon heard on 14,313 kHz from Nuka Hiva, Moorea, Bora Bora, or Viti Levu. This Local was interested.

We continued, telling him about the great DX Tests—the WPX and the *CQ* WW DX Tests in which you can work DX around the world and around the clock 24 hours a day just by swinging the beam. When we finished, there were lights shining in the eyes of the Local. He had heard the word; he had taken the lure. He just had to know more.

"The first thing in DXing you have to learn," we gravely advised the Local, "is that the difference between a rag-chewer and a DXer is a tower and a beam. Some may still think that high power is the DXer's key to success. Forget it! A tall tower with a big beam does it all!"

This message was getting through. It was easy to note the thought processes at work as the Local thought of where he might locate a tower on his property, of if it might be necessary to find a new QTH to ensure a good shot in all directions. We were sure that before long he would be thinking of those places in this county where you can fire out over the Pacific in one direction and across or up or down the bay in the other direction.

77 Coleman Dr., San Rafael, CA 94901

Here is Arch Doty, K8CFU, once the scourge of the lower Michigan peninsula, but now living high in the mountains in North Carolina. Arch says he did everything with low power, even attaining the DXCC Honor Roll. We believe him. With that dog who would argue?

One learns but one lesson at a time, and it was the primary tenet of DXing that we were expounding. "Big beams and high towers work DX," we repeatedly emphasized. It was not long before the Local was repeating the axiom word for word. Off he went, but we were sure we would hear from him again.

A couple of months or so later the Local was back. "Say," he said with an opening always remarkable for its originality, "you should see the beam I put up since I was last here. Eighty feet above the ridge at our new QTH, separate mono-banders for 10, 15, and 20. And I have a clear shot in all directions. Of course, the XYL is still complaining that on top of the ridge between the ocean and the bay the wind never stops blowing. I keep telling her that she will get used to it. Do you think she will?"

Of course she would! Every XYL, though she may not be interested in amateur radio or DXing, always takes pride in the accomplishments of the lord of the manor. How often have you heard that strong note of feeling in an XYL's voice when you inquire about a fellow DXer. "Oh, he's been down in the shack all week listening for Malpelo." If it is not Malpelo, it probably will be the Maldives or Maria Theresa. And when the QSLs come through, which member of the family takes the greatest joy? You can hear the ringing overtones when the question is asked, "Here's your QSL, and where the heck is Juan da Nova?" But it was not because he was bursting with joy that the Local came. He had more questions.

"I got the tower up and the antennas tuned for the DX portions of the bands," the Local told us, "but I don't seem to be working much. Sometimes I hear some DX. Occasionally I will work something but it does seem that things are not what I expected. I thought that the beam would be making a bigger difference. What do you think?"

What did we think? Just as all DXers think. That some new gear would make a big difference. "Head down to HRO," we advised the Local, "and talk things over with W6RJ. Bob Ferrero will have some good ideas on what you might need. Bob is a big DXer himself, and you will recognize him from his picture in the HRO advertisements in *CQ*. And be sure to let me know how things go." We were sure that he would. We were also sure that when next he heard of the Local he would be winning all the local club DX tests and probably would even be named the club's DXer of Year at the big Christmas party where no gift is over 75 cents. We could hardly believe that the Local could miss.

It was a surprise to see him again in a month or so. Possibly he could not miss, but apparently he was not making many hits. He still had some problems, and there were still questions unanswered. There were still hopes unfulfilled.

"You know the suggestion you gave me about looking at some new gear," he said, and we nodded our heads at the words. "Well, I got one of those rigs with all the digital readouts, the kind that all real DXers have, and this one allows me to QSY from band to band without retuning. It covers the WARC bands, and has the UP conversion and the PLL circuit to keep the frequency stable. It has two VFOs and low front-end noise. It has LDC readout, VDC final, QSK CW automatic offset, a 500 Hz CW filter, tunable memories, and a speech processor. It even has things that as yet I don't understand. But it does not have DX. What am I doing wrong?"

Real DXers seldom do anything wrong. Some just do things better than others. So we ran through a checklist with the Local. Everything seemed to be in order. "What are you using for a linear?" we finally asked, and the Local shrugged.

"Somehow I got the idea that with a high tower, a new rig, and some nice-looking accessories that I saw at the radio store, I would not have to have a linear. My signal reports are good. At times there are comments on how good the signal is, but that comes only after I have managed to get through. If they can read me so well, then what is the trouble in getting through to them? I thought it would be easier. What am I doing wrong?"

The WPX Program

Mixed

1169	K7NN	1172	KA2MBC
1170	I2QMU	1173	YU3BQ
1171	YCØDNK	1174	KA1SR

S.S.B.

1746	LA7JO	1749	I6GAS
1747	G4UNH	1750	W6OUL
1748	TF5BW	1751	CT1BY

CW

2327	OK3RRC	2328	W6OUL

Endorsements

Mixed: 450 K7NN, I2QMU, VE7EIG, YU3BQ, KA1SR. 500 K7NN, I2QMU, VE7EIG, YU3BQ, KA1SR. 550 K7NN, I2QMU, YU3BQ. 600 K7NN, I2QMU, YU3BQ. 650 K7NN, I2QMU, YU3BQ. 700 K7NN, I2QMU, YU3BQ. 750 K7NN, I2QMU, YU3BQ. 800 K7NN, IØAOF. 850 K7NN. 900 OE1KJW, K9ZO, K7NN, 3A2LF. 950 JA4ESR, K9ZO, K7NN. 1000 JA4ESR, K9ZO, K7NN. 1050 K9ZO, K7NN, N2AC, K2POF. 1100 K9ZO, K7NN. 1150 K7NN. 1200 K7NN. 1250 K7NN. 1300 K7NN. 1350 K7NN. 1400 K7NN. 1450 K7NN. 1500 K7NN, WA4QMQ. 1550 K7NN.

S.S.B.: 350 LA7JO, DL8ZAW, I6GAS, KE6KT, W6OUL, CT1BY. 400 LA7JO, I6GAS, W6OUL, CT1BWY. 450 OE1KJW, LA7JO, I6GAS, W6OUL, CT1BWY. 500 LA7JO, I6GAS, W6OUL, CT1BWY. 550 LA7JO, I6GAS, W6OUL, CT1BY. 600 I2EOW, LA7JO, I2TZK, I6GAS, W6OUL, CT1BWY. 650 LA7JO, I2TZK, I6GAS, W6OUL, CT1BWY. 700 LA7JO, W6OUL, CT1BWY. 750 LA7JO, W7KWI. 800 LA7JO, WO4L, DK5WQ. 850 LA7JO. 900 LA7JO. 950 LA7JO. 1000 LA7JO. 1050 LA7JO. 1100 LA7JO. 1150 LA7JO. 1750 9H4G.

C.W.: 350 W6OUL. 400 KY9P, W6OUL. 450 W6OUL. 500 W6OUL. 550 W6OUL, PA3DBG. 600 W6OUL. 650 OK3CFF, W6OUL. 700 JA7FFN/1, W6OUL. 750 W6OUL. 800 W6OUL. 900 DJ1YH. 1400 WA4QMQ.

10 meters:	JA4ESR, I3ZKD.
15 meters:	I3ZKD, DK5WQ.
20 meters:	I3ZKD.
40 meters:	JA4ESR, I3ZKD, W6OUL.
80 meters:	I3ZKD, OE9SLH, W6OUL.
Asia:	I3ZKD, PA3DBG.
Africa:	I3ZKD.
No. America:	JA2KVD, I3ZKD, OK3BT.
So. America:	I3ZKD, WA4OIB.
Europe:	I3ZKD, DL8ZAW, TF5BW.
Oceania:	I3ZKD.

Award of Excellence Holders: K6JG, N4MM, W4CRW, K5UR, K6XP, K2VV, VE3GCO, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, YU2DX, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, IØJX, WA1JMP, KØJN, K4IEX, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, W8RSW, WA4QMQ, W8ILC, VE7DP, K9BG, W1BWS, G4BUE, N3ED, LU3YZ/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SMØDJZ, DK5AD, WD9IIC, W3ARK, LA7JO.

Award of Excellence Holders with 160 meter endorsement: K6JG, W4CRW, K5UR, OK1MP, W8CNL, W1JR, W5UR, W8RSW, W8ILC, W1BWS, G4BUE, LU3YL/W4, VE7WJ, W9NUF, N4NX, SMØDJZ, DK5AD, W3ARK, LA7JO.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if air-mail desired) to CQ WPX Awards, P.O. Box 1351, Torrance, CA 90505-0351 U.S.A.

Actually, there was nothing that we could think of off-hand that he was doing wrong. Everything he had done to this point seemed to be straightforward and right. Everything was in accord with almost every DX book ever written. We had to explain that DX stations tend to respond to the strongest signal heard.

"Of course they can hear you easily when you are out in the clear," we counseled, "but when there is a pile-up, it is natural that they'll respond to the signal that stands above the tumult and shouting. They work the signals they can read easily. And, unless you have an extremely exotic callsign that the station under the pile-up might need, they simply just work the loudest and most legible. You will even find that if the exotic DX callsign is not loud, it will be lost in a pile-up." We paused to let all of this sink in. Then we added, "Maybe you'd better try thinking about a linear."

This time the Local had moved before we did. "I've been looking at some," he was quick to advise us, "and from what I've been able to find, they all seem to be about the same. But I was talking with a fellow downstate a couple of weeks ago, and he told me that he had a friend nearby who had something called a 4K that had never been used off 20 meters and that this friend might let it go at a good price. He also said that if I would give him a call on the landline, he would tell me how to get one of those 5K rigs that the advertisements say are not intended for U.S. amateurs. What do you think?"

Son of a gun! We hardly knew what to think. Over the years we have looked at a lot of stations of DXers, but we could not recall ever seeing one of those rigs on line in those shacks. There were instances we remembered when we had wondered about the oversized cable that snaked out of the shack and into the garage, but when we asked one time, we were assured that it was but for the air-conditioning unit, this being one which drew a lot of amps. "Of course you know," we cautioned, "that those rigs are illegal for the W/Ks to run. Maybe yes in some other countries, but not the U.S." That might have been the right explana-

The WAZ Program

15 Meter Phone

221	DK5AD	222	JM1GAW

20 Meter Phone

537	KE4YD	539	K8DFC
538	KD9CN	540	JA4NNG

40 Meter Phone

31	JH1XYR	32	A-71AD

80 Meter Phone

31	EA8XS

20 Meter CW

230	VK1DH

All Band WAZ

S.S.B.

2962	NE8Q	2964	KM9Y
2963	EA1AWW	2965	CT1BWY

C.W. and Phone

5887	F6HKD	5891	W8ZNH
5888	DL2DN	5892	LA1IE
5889	ZS1PS	5893	OE6WK
5890	KM9Y	5894	G4CJY

Applications and reprints of the latest rules may be obtained by sending a self addressed stamped envelope (37 cents) size 4½ × 9½ to the WAZ Manager, Leo Haijsman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904. Applicants forwarding QSL cards either direct to the WAZ manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all C.Q. awards is $4.00 for subscribers and $10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest CQ mailing label with your application.

tion, but it was not one the Local understood.

"Hold it!" he said, and he started with more questions. We finally had to tell him that that was another story, one for which we would not have enough time that day to even start exploring. For a half-century there have been those who have tried to understand, but as yet are not sure just what happened. They know, but they don't know. We had no intention of getting into that pot.

"Well," the Local finally asked, "what do you think I should do?" and we gave him the best advice that any DXer could get. "Look over all of them," we said, and we did not see the Local for another couple of months. But he finally did return. We had thought that the whole spectrum of DXing had been covered save, possibly, for list operations and DX Nets. We were sure that by now the Local would be winging it in DX circles. What we thought was not what we got.

When we saw him again we could not mistake the sad overtone in his voice. We thought possibly he had missed Bouvet, but we had not heard of that being on . . . yet.

"Look," the Local said, and there was hurt in his voice. "Since I first started talking to you months back I've done everything you suggested, but I'm still not working DX. What's wrong?"

"Such as?" we countered, and the Local was into his routine. "I try working the bands when I get home from work," he said. "Everything is dead. Where did I ever get the idea that 20 would be open all night long? The noise is terrible and the conditions are bad. And all I am hearing are the W4s and W5s. This is not what I expected DX to be, or what I was told!"

We had to think this over, and the thought finally started getting through to us that perhaps this one had never heard about the sunspot cycle. So we had to explain all of this—how the sunspots go up and the sunspots go down. And so does DX. When they are up, the DX is unbelievable. When they are down . . . well, most DXers would rather forget those years. But we had to explain that when the sunspots are down, DX is terrible and sometimes even worse than that.

We were relieved to see that the Local did not immediately panic. "Okay," he finally said, "maybe I won't work the Indian Ocean for a year or so, but I'll work all the short-skip, and when the next cycle is here, I'll be ready and primed. I'll know all about DXing. That should work, shouldn't it?"

Of course it should. When one is patient, it is easy to learn the lesson that all things come to him who waits—long enough. And if one upgrades the station when the cycle is down, DX will come like iron filings to a magnet when the cycle is up. All you have to do is wait . . . and wait.

And that was the way things went. But finally the Local got around to specifics. "This sunspot cycle. When did you say we would reach the bottom?"

We hadn't and did not want to, but there was no dodging. "Some are saying that we will bottom about June 1987. Others say that it won't be until March 1988. But it's coming. It always has."

After awhile the Local shrugged. "Now I can better understand why it takes so long to get on the Honor Roll," he said. "You can't work DX all the time because DX is not here all the time, right?"

He was satisfied when we acknowledged that he was understanding. But we were happy he had not gotten into the area of discussion about some DX countries that have not been heard for a quarter century or so. Right then we did not want him to get discouraged. He would learn that after a cycle or two, the big total DXers are the DXers that hang in there, if you start young enough. But persevere. Even if it isn't the top of the cycle, there will always be some DX available. Sometimes more than others.

5 Band WAZ

Standings as of July 1, 1985

All 200 zones worked:

1. ON4UN	35. ON5NT	69. DL4YAH
2. K4MQG	36. OH6JW	70. LA7ZO
3. SM4CAN	37. OK1AWZ	71. W9ZR
4. AA6AA	38. IV3PRK	72. W1NG
5. W8AH	39. DJ6RX	73. VK9NS
6. W6KUT	40. OH3YI	74. N4KG
7. EA8AK	41. I4RYC	75. YU7DX
8. LA7JO	42. ZL1BIL	76. DL8MAG
9. EA3SF	43. I4EAT	77. OK3DG
10. OH1XX	44. ZL1BQD	78. ZL1BOQ
11. EA8OZ	45. TG9NX	79. EA9IE
12. W0SD	46. XE1J	80. DL7HZ
13. K0ZZ	47. F5VU	81. DJ9RQ
14. ON6OS	48. W3AP	82. EA5SP
15. OK3TCA	49. YO3AC	83. EA2IA
16. K6SSS	50. K3TW	84. SP3BQD
17. ZL3GQ	51. XE1OX	85. LZ1NG
18. OK3CGP	52. VE7IG	86. N4JF
19. SM0AJU	53. OK1ADM	87. CT2AK
20. OZ3PZ	54. CT1FL	88. HB9CIP
21. I3MAU	55. WA1AER	89. OK1MG
22. I2ZGC	56. N4RR	90. CT4BD
23. 4Z4DX	57. UW0MF	91. VK6HD
24. N4KE	58. W4DR	92. EA6ET
25. K5UR	59. OK1MP	93. VK3QI
26. K9AJ	60. W1NW	94. LZ2DF
27. SM3EVR	61. OE1ZJ	95. ON4QX
28. LA5YJ	62. HB9AHL	96. SM0DJC
29. DL3RK	63. HB9AMO	97. CT3BM
30. N4WJ	64. LA6OT	98. K2TQC
31. G3MCS	65. UR2QD	99. EA8XS
32. SM5AQD	66. UK2RDX	100. HA9RE
33. W0MLY	67. ZS5LB	101. SM4CTT
34. I0RIZ	68. F6DZU	

The top 12 contenders for 5 Band WAZ are:

1. DK5AD, 199	7. LA9GV, 198
2. JA3EMU, 199	8. W6GO, 198
3. N4WW, 199	9. W4CEB, 198
4. A71AD, 199	10. W2YY, 198
5. K6YRA, 199	11. SM5AKT, 198
6. W8UVZ, 199	12. G3GIQ, 198

327 Stations have attained the 150 zone level

Sri Lanka

Vincent Paul Perera, 4S7PVR, writes from downtown Mount Lavinia that there are accommodations available, and during the last year a number of visiting DXers have passed through the area. These have included ON5OS, SM2EJE, DL7NH, and WB4ATV. Paul even notes that Wayne Warden, W9GW, has a license sitting at the bureau should he be able to double-back to 4S7-land.

At the local overnight stop, maybe a bit longer at times, six received callsigns while in Sri Lanka. Some months back there were some political problems in the northern tip of the island, but Paul notes that that was a somewhat local problem and little affected the southern part around Colombo.

Should you be looking for late information on operating from 4S7-land, drop a line to 4S7PVR at 84 Templars Road, Mount Lavinia, Sri Lanka, and he will be able to advise on accommodations, licenses, and most anything else you need.

U.N. 40th Anniversary

The 4U1UN at United Nations Headquarters in New York is offering an award for working two of the U.N. amateur radio stations during the 40th anniversary year of the signing of the U.N. charter in San Francisco in 1945. The stations to look for are 4U1UN at the New York headquarters, 4U1ITU at the ITU headquarters in Geneva, and 4U1VIC at the Vienna International Center in Austria. The date of the signing was 24 October 1945. Any contact during the calendar year 1985 counts for the award.

Send list of stations worked including date, time, mode, report, and band to: U.N. Staff Recreation Council, Amateur Radio Club, Room DC1-0724, Box 20, New York, NY 10017. They ask for $5.00 or 15 IRCs, this

CQ DX Awards Program

S.S.B.

1425	KM9Y	1427	TF5EP
1426	G4XZX	1428	TF5BW

C.W.

642 KM9Y

S.S.B. Endorsements

310	DL9OH/316	300	SM4CTT/307
310	K6YRA/315	300	WA4WTG/306
310	N4JF/316	275	XE1OX/299
310	XE1AE/315	275	XE1OW/292
310	N2SS/312	250	KM9Y/258
300	9H4G/309	3.5/7 MHz	9H4G

C.W. Endorsements

310	K4CEB/316	200	KM9Y/245
310	N4PN/315		

Total number of active countries is 315. The basic award fee for subscribers to CQ is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an s.a.s.e. is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for air-mail reply. Please make all checks payable to the awards manager.

mainly going to the United Nations Childrens Fund.

In Vienna 4U1VIC is still living well on Wagramer Strasse while waiting for country status. During the year it was visited by a number of DXers. Some of the guest operations at the club station included K7ZR, W9WGQ, K6AYA, WD9GSD, and WB6DXU. W8ZFV was in Vienna on a contract for UNIDO. The 4U1VIC club is putting out a newsletter, and you can look for them in the *CQ* WW Test later this month. Remember, 4U1VIC may be a DXCC counter one of these days. Maybe even sooner. And while we are working that side of the street, 4U1VIC asks that Austrian stamps not be sent with QSLs. They do have to take these downtown to mail, and 7 schillings, the amount usually sent, is not sufficient for airmail service. Send two IRCs and you will get your QSL with U.N. Vienna stamps. By this time there is a good possibility that a third party traffic agreement will be signed for the U.N. outpost.

Also, in the case of guest operators, do not QSL to their home QTH unless that is specifically requested. The name or handle of the operator on the QSL will facilitate handling.

Recently named Honorary President of SARL, the Finnish Amateur Radio League, Armas Valste, OH2NB, has long been a top OH-DX type. Armas served as president of SRAL back in the sixties, combining this with a long service in amateur athletics. Over the years he put in a long term as Head Coach of the Finnish track and field organization and also served as General Manager. In his youth he held a number of championships in the high jump and shotput. Armas has also signed CT1BCM in recent years.

Armas Valste, OH2NB

The 80th birthday of Armas Valste was also the day he received his 5BDXCC award. Should you wonder why it took such a top DXer so long, it really did not. Armas worked this one from CT1BCM in Portugal.

Long a member of the DXCC Honor Roll, Armas was elected Honorary President of the Finnish Radio Society earlier this year, this continuing a record of amateur services. Back in 1968 he was the President of SRAL.

Amateur radio is not the only field in which OH2NB has excelled. In his youth he participated in track and field events, winning six Finnish championships in the shotput and four in the high jump. In those days he often competed against Urho Kekkonen, who later was president of the Republic of Finland. In 1936 Armas became head coach of the Finnish Sport Federation, and was its general manager from 1963 to 1968.

Currently living in Albufeira in southern Portugal, at least during the winters, Armas continues to be active on the air and is usually found operating CW, a mode he has long championed.

Forty Meters

In response to a petition from Puerto Rico's amateurs, the FCC some months back issued a Notice of Proposed Rule Making to allow phone in the 40 meter band down to 7075 kHz by amateurs outside the continental U.S., or the lower 48, as sometimes noted.

This came following the action of the FCC in 1984 to allow such operations to General and higher class licensees in the Pacific, including Hawaii and Alaska. In their petition the Puerto Rican amateurs point out that Puerto Rico and the U.S. Virgin Islands were the only noncontinental U.S. areas not allowed this privilege.

Comments on this matter were due about mid-year, and possibly by this time something will be surfacing on this matter.

Working the same area, it might be noted that recently the FCC eliminated the need for third class radiotelephone licenses for maritime or aviation VHF in U.S. territory. The FCC noted that such licenses were issued to anyone who applied, and were relatively meaningless. Licenses in such operations will still be required for the medium- or high-frequency bands. They will also be needed when outside the U.S.

Montserrat

Ed Radlo, AJ6V, will be in Montserrat for the *CQ* WW CW Test next month. Ed will be operating in the single-operator, all-band category. In 1983 Ed also operated from Montserrat and was twelfth world overall in the DX test. He will be signing VP2MEV again. Only the 1985 or later *Callbook* has his correct address.

Thailand

John Knight, W6YY, passes along the information that though the Thailand Minister of Communications lifted the ban on amateur communications early this year, the Thai Posts, Telegraph and Telephones Department made their own decision to withhold any operating authority pending examination of all would-be amateurs.

In the past all licenses in Thailand have been informally issued by the Radio Amateur Society of Thailand (RAST). One of the problems with implementing all of the above is that some RAST members are worried if new calls will be assigned and their old callsigns lost. The examinations for HS licenses were expected to have taken place during this summer, and HS stations will be showing under the new license procedures early this fall.

Saint Martin/FS7

The St. Martin Radio Club wants to again bring to the attention of those planning a visit to any of the French Antilles that the power limitation is 100 watts. If you are planning a trip to FM/FG/FS with some possible amateur operation, figure to leave your linear at home. The problem is not helped when some have difficulty in getting a copy of the local PTT regulations. Also, some French-licensed DX stations express concern when checking contest results, as the 100 watts from the French Antilles often shows in the scores.

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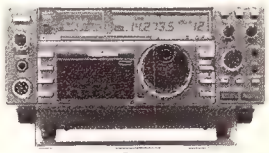

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Yaesu FTC-2203, FT-4703
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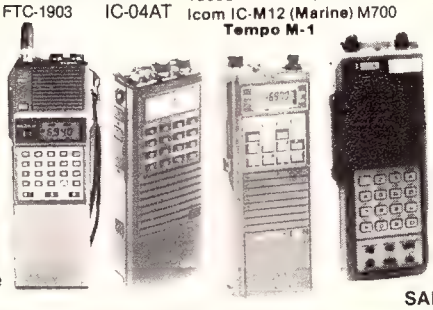
Tempo M-1



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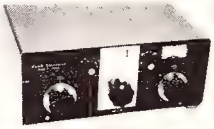

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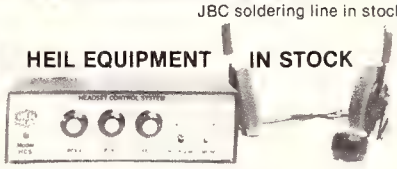

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The WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with CQ master prefix list. Scores are based on the current prefix total regardless of an operator's all-time count. Honor Roll must be up-dated annually by addition to, or to confirm present total. If no up-date, file will be placed into "inactive" until next up-date. Lifetime Honor Roll fee $2.00, with no fees required for up-dates.

MIXED

2815	F9RM	1767	N2AC	1367	K8LJG	1159	G4FAM	876	VE2PD
2740	YU2DX	1754	YU1DZ	1338	SM6DHU	1126	YU4YA	858	K7CU
2484	K6JG	1699	SM7TV	1338	WA8YTM	1095	KA3A	856	DF6EX
2480	W2NC	1689	I2PHN	1335	N6JM	1070	YU2CQ	851	JH8NYK
2305	K2VV	1677	I8YRK	1330	YU7KV	1048	WD9IIC	841	I0AOF
2277	K6XP	1660	YU7AW	1300	N5TV	1040	N4IB	837	VE2FOU
2237	VE3GCO	1648	W8CNL	1268	IS0LYN	1012	N8BJQ	829	VE5ADA
2179	N4MM	1603	I6SF	1251	I2MQP	999	KS7T	827	PY1DFF
2126	W4BQY	1589	I3ZKO	1250	N4NX	994	YU2CBK	801	YU1OHF
2082	W9DWQ	1577	K9BG	1249	KL7AF	980	K2POF	800	KO2Q
1951	YU7BCD	1572	W0SFU	1240	N6AW	952	W6YMH	752	JH4UVU
1905	N6CW	1536	W1NG	1238	LA7JO	947	WD4RAF	745	KX1A
1905	N9AF	1501	KF2O	1226	W7CB	933	N2AIF	739	NE6I
1892	YU2TW	1491	WA1JMP	1196	YU7AJD	914	AI8S	722	K8HF
1889	N6JV	1482	IN3ANE	1190	DK5AD	913	AI6Z	630	WI4K
1875	N4UU	1467	K6ZDL	1187	EA9IE	910	YU1SZ	611	JO1BMV
1837	K5UR	1464	EA2IA	1172	WB8ZRL	905	W0JIE	605	W9PWM
1815	PA0SNG	1396	W9NUF	1164	CT1LN	904	W3GXK	600	N3KR
1801	YU7BPQ	1391	PY4OD						

S.S.B.

2710	F9RM	1558	K5UR	1167	W1NG	1000	WB8ZRL	792	Z21GJ
2273	I0ZV	1557	PA0SNG	1147	W2NC	994	KL7AF	787	W2XQ
2082	K6JG	1556	YU7BCD	1136	ZP5RS	993	HI8GB	761	WB6SRK
2029	I0AMU	1527	N4NO	1131	W2CC	954	KC8YM	755	WO4L
2022	J6XP	1503	W9DWQ	1103	W3ARK	948	XE1XF	736	K3IXD
1887	ZL3NS	1472	W4BQY	1100	N5TV	948	KK0L	721	IN3AHO
1968	K2POA	1385	YU7AW	1100	G4CHP	946	I1POR	688	W6YMH
1966	K2VV	1380	N4UU	1099	N6FX	937	K8LJG	683	K9BQL
1921	N4MM	1376	N2SS	1094	KC4OV	901	PY4VX	663	KB0C
1739	CT1UA	1340	VE1YX	1081	XE1OX	895	WA2FKF	661	K8ZZO
1690	I4ZSQ	1325	WA4QMQ	1080	TG9GI	868	PY4OD	655	EA8AKN
1690	OZ5EV	1310	CT4NH	1062	W9NUF	858	VE2PD	649	KK5P
1677	HB9AAA	1292	WF4V	1048	I8KCI	850	N4IB	649	IK5ACO
1658	W0YDB	1269	I6NOA	1044	AC2J	845	WA0DCQ	621	AG2K
1649	I2PHN	1249	KF2O	1033	N2AC	838	W0ULU	617	WI4K
1633	I8YRK	1230	I2MQP	1029	EA2IA	810	CT1BY	610	VO1AW
1618	I0MBX	1223	PY3BXW	1028	JH1VRQ	810	I0SGF	600	W7KWI
1605	I8KDB	1197	CT1FL	1013	N4NX	801	CT4UW	600	KC2FC
1600	WD8MGQ	1176	WA4OIB	1008	I1HAG				

C.W.

2239	W2NC	1553	N4UU	1244	N4YB	999	KF2O	755	N4NX
1863	N6JV	1532	VE7CNE	1184	W4WJ	995	KA7T	748	N2AIF
1850	WA2HZR	1507	N2AC	1182	K6ZDL	990	W9NUF	723	YU2CQ
1834	K2VV	1475	N4MM	1180	PY1APS	970	IT9VDQ	708	YK1AO
1809	K8KPL	1442	K5UR	1163	N6FX	963	K8LJG	700	VE2FOU
1796	K6JG	1435	ON4QX	1148	EA2IA	897	KL7AF	655	SM5DAC
1785	N4NO	1401	YU7SF	1133	JE1JKL	888	DJ1YH	645	PA3CKO
1739	W3ARK	1383	VO1AW	1133	I2DMK	874	K2POF	633	W2XQ
1680	K6XP	1355	I6SF	1123	I1YRL	827	NN4Q	616	VE1CK
1657	W9DWQ	1305	LZ1XL	1111	PY4OD	813	JH1VRQ	605	LA7JO
1650	W4BQY	1294	K9QVB	1107	JA1KRU	797	AK2H	601	F6HKD
1635	DL1QT	1286	YU3NP	1011	W1NG	771	G4FAM	600	W6YMH
1608	G2GM	1278	YU7AW	1000	N5TV	767	WD9IIC	600	VE4AEX
1555	YU7BCD								

Note that the above refers to the French Antilles. It is possible that in Sint Maarten, this being across the street on the same island as St. Martin, you will encounter Dutch regulations. What to do? When in doubt, or planning a trip where you are not firm on the regulations, ask Noaki Akiyama, N1CIX, in downtown Newington. Nao has the answers to most everything on international questions. He might even tell you where to look for JAs in the *CQ* WW Test this month. Nao does work as the liaison with sister societies of the ARRL, among the other duties he handles. If you are traveling and plan to operate, don't leave home without Naoki's help.

Father Moran

Many DXers had a chance to visit with Father Moran, 9N1MM, when he was touring the states last year. Frank Nagy, N8BIB, passes along the note that Father Moran always has a continuing need for books for his St. Xaviers School at Godavari, just south of Kathmandu.

There are currently 300 students at 9N1MM's school, and for years the possibility of working Nepal has usually depended on Father Moran being on the air. If you are interested in disposing of surplus books, drop a line to Frank Nagy, 24315 Waltz Road, New Boston, MI 48164, and he will advise how to ship. There is a weight limit of 11 pounds per parcel in case you want to know.

Father Marshall Moran, 9N1MM, stands in the Library at St. Xavier's School at Godavari, a few miles outside Kathmandu. Long the best hope for DXers needing Nepal, Father Moran traveled in the states last year visiting the Deserving.

Sunspots

DXers always like to talk about things they do not have but need. These include high towers, high QTHs, and high DXCC totals. Lately they have been talking about low sunspot numbers, and the cry is often heard in the land, "When will it end?"

Soon, but not yet. The April sunspot numbers are compiled by the good A. Koeckelbergh of the Sunspot Index Data Center in Brussels showed the mean for the month as 16.1. The best day had 31 spots, and there were 14 days when the count was 10 or less. Seven days had zero sunspot counts.

We are nearing the bottom, but often the bottom is hard to tell until you are a bit beyond it. Boulder, the home of WWV, is looking for a bottom about June 1987. Our own in-house N4XX is looking for the bottom in the spring of 1988.

The present Cycle 21 started up in June 1976 and reached a peak 41 months later in December 1979. The 12-month running average at the peak was 164.5. The curve flattens when it is nearing bottom, and the current cycle appears to be flattening. When the new cycle starts, it goes up fast, DX improves, and happy DXers are capering everywhere. Right now the dying Cycle 20 seems to be feeling for bottom. There it bounces along for a year or so, perhaps even a bit more. The Great Days of DXing are coming. Be Prepared! But not just yet.

WPX

Norm Koch, K6ZDL, long a toiler in the WPX vineyard, passes along some pertinent notes on the WPX program. Norm has been handling that chore for a number of years now, working to bring order out of confusion, and in recent years he has converted much of the WPX records to computer listings.

Norm recently noted that on the WPX Honor Roll both the CW and the SSB modes have been computerized, all the way down to those with 1000 counters. He is working on the mixed mode and will have this lined out sometime in the future.

The computer is coming up with some items that need attention—things like poor record-keeping, duplications scattered through a station's file, as well as the same prefix being claimed five or six times. As the files are put into the computer, these aberrations are being flagged and corrected.

An audit of the WPX Honor Roll some months back raised some questions, and eventually two stations (not W/Ks) were dropped from the listings for failure to comply with the rules. The audit also extended to reviews utilizing some overseas checkpoints where there was some feeling that the Honor Roll was being sandbagged.

Want to check your WPX listings? Norm will furnish you with a printout of your file for $2.00, or 10 IRCs, plus a business-size envelope with at least 39¢ U.S. postage affixed. Write directly to K6ZDL.

A Multitude of DX Notes

Father Dave Reddy, CE0AE, passed away

on June 7th. For a good many years Father Dave was the reliable source for an Easter Island contact. His arrival there ended a long scarcity that had existed since the USAF station on the island was disbanded. Father Dave was a member of The Order of Franciscan Minors.

There seems always to be a DXer needing VR6-Pitcairn Island. A month or so back AT&T made it a bit easier for the deserving DXer. They began serving Pitcairn with telephone service. Calls are routed to Pitcairn via New Zealand and highseas radio transmissions. It cost $11.83 for the first three minutes and individuals in the U.S. will have to make reservations to place a call.

There is but one telephone on the island. Guess who has it? For a clue, name someone on the island whose name you know, well. Right! VR6TC, Tom Christian.

The Radio Club de Chile wants to clear up the CE0AA QSLing, and Rogelio Gomez Fernandez, CE3GF, advises that cards sent to Box 700 in Santiago were caught up a couple of months back. Some QSLs received were put aside because the card did not match up with the logs, these to be run through after the backlog was cleared in an effort to reconcile the card with a log entry. Rogelio asks that anyone with any queries write directly to the Radio Club de Chile, Box 700, Santiago, Chile, and outline the problem. Some have noted cards coming back via unexpected routes. However, if you still do not have the needed CE0AA QSL, write direct. The club wants to get all the problems straightened out.

Jim Smith, VK9NS, has been reported as mentioning that another scientific group might be on Heard around the turn into 1986. In June 5X5 cards from 5X5GK for activity after August 28, 1984. The DXCC desk was also looking with approval on 5X5BD and 5X5WR.

If Zone 2 for WAZ has been heart-break hill for you, note that VE3JKC/VE2 is on the air and will be there until 1987. He is at Harrington Harbor in the southern entrance to the Strait of Belle Island, about 50'30"N, 59'25"W, more or less. As long as we are in the Canadian circuit, VX6 was used to mark the centennial of Lethbridge in Alberta for two weeks in July. VA1 was used for the bicentennial of Sydney in Nova Scotia, also in July. The Heard Island DX Assn. has an official report of their 1983 Heard effort. It covers both the mountaineering and amateur action. Good reports from those who have read it. Ten dollars to the HIDXA, Box 90, Norfolk Island 2899, Australia will put it in your hands. A month or so back we saw a photo from this trip used in advertising for scuba gear.

Robert Shelton, N2EDF, made a 40-minute videotape, edited and suitable for presentation, while on the Navassa effort a few months back. If you would like to make a copy of the 6Y5NR/KP1 effort, write to N2EDF at 11 North Clarke Street, Ogdensburg, NJ 07439. Five dollars will cover expenses. Write if you want more details.

You will be hearing the CH-prefix in Canada for a month starting on October 16th to mark the 100th anniversary of Louis Riel. A political activist in western Canada, among other things, he led the second Riel Rebellion in 1884, was convicted of treason in 1885, and was executed at Regina. Eber Diehl, W7AMM, has the logs for his operations in Iran as EP2EJ from 1971 to 1977, and if you need an EP2EJ QSL, all you have to do is ask with an SASE. Write to W7AMM at P.O. Box 2026, Sierra Vista, AZ 85636.

The Wireless Institute of Australia amateurs have been using the alternate VI-prefix and will use it until the end of the year. This is to mark the 75th anniversary of the WIA, the world's first and oldest national radio society, they proudly proclaim. This will be used throughout Australia. Once before it was used briefly locally in VK3. Also, a VK75A callsign is authorized for use throughout Australia. This is VK75A . . . period.

If you are making long-range plans, the 1986 great International DX Convention will be back at the Holiday Inn in Visalia, April 19–20th. The Southern California DX Club will be host this year, and they have already signed a contract for all the rooms in the hotel. Everything! Nothing but DX knee deep.

SU1ER says that the Egyptian Amateur Radio Society might be found most Fridays and Saturdays at 14175 kHz or 14275 kHz from 1700–2100Z. JH1RNZ got married and headed for Fiji on a DXpedition along with the bride. JAs report that 3D2RN was not heard during daytime hours, but 160 through 20 was busy with pile-ups every night. Seems that there is a story under all of that somewhere. 8J1XPO is on from the Tsukuba Science Exposition. QSL via JARL.

In June the ARRL filed a petition for more Novice privileges to meet their goal of 600K licensees in the U.S. by 1990. After "massaging" by the staff, the proposal includes expansion of the 28 MHz Novice/Tech band to allow CW and data communications at 28.1–28.3 MHz and CW and SSB from 28.3–28.5 MHz; Novice privileges on 220 MHz; Novice privileges in the 1240 MHz band; and a couple of other ideas. The word is that there is much inactivity among Novices—". . . tens of thousands" have never used their licenses to make a single contact. The July statement said, ". . . while Morse code is, and probably always will be, an integral part of Amateur Radio, it is not the only mode that is appropriate for a beginner to use."

Remember, the season for DXing starts later this month—the great *CQ* World-Wide Phone DX Test the last weekend of the month. Don't worry about the sunspot cycle. Just check WWV and jump in. Low bands might be even deeper. 73, Cass, WA6AUD

DX Ten Years Back

LA1SH/BY was heard out of China. There was some skepticism, but eventually it appeared he had been in Darien, but aboard a merchant vessel tied up at the dock. EP2SN was on frequently trying to fill out a WAS. W3ACE, once a U.S. ambassador, visited the top man for radio affairs in Baghdad while on a visit. Discussing the amateur operating situation, the official expressed the view that perhaps some amateur radio activity would be possible, also some good p.r. Hank immediately applied for a YL-license. It was immediately rejected. W6KNH was off on a trip with stops at BV, 9V1, 9M2, 9N1, VU, 4S7, 5Z4, ZE, and PY and planned to operate as possible at each stop. The Colvins were preparing to head out on DXpeditions again after a long layoff. Sable and St. Paul Islands showed for new DXCC countries for the Deserving. Tuvalu was also due up as a true-blue counter within a few months. EA8CR was headed for Equatorial Guinea for the *CQ* WW CW Test, and CR9AJ was active from Macao. And how about the sunspot cycle of Cycle 20—headed for the bottom and just about there.

QSL Information

All of this comes with a lot of help and W9LNQ.

AX6ITU to VK6DU
CT3EU to G3PFS
DL7FT/SV to DL7FT
EB2ITU to EA1QF
EF5UIT to EA5CS
EP2EJ to W7AMM
HB9APJ/OX to HB9APJ
HB9ASJ/OX to HB9ASJ
HP1XKA to JA7AGO
J5WAD to W6CNA
JV1UB to JT1KAA
JY5CI to G4WFZ
JY9MG to JR3XMG
JY9WR to G4ATS
OG3AA to OH3AA
ON6TW/GU0 to ON7JF
P29SN/ZL1 to ZL2BOF
PT0MI to W3DJZ
SV9CS to SV-Bureau
SV0DH/5 to Bureau/or 85CB
V2A to W2 Bureau
XJ4RMP to VE4AKN
ZC4AB to G4SDJ/85 CB
ZC4CZ to G4MJQ
3X0HAB to DL8CM
7S1SSA to SM1ALH
7S4SSA to SM Bureau
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World of Ideas

a monthly feature by
DAVE INGRAM, K4TWJ

A LOOK AT THE WORLD AROUND US

Understanding Modern Amateur Gear—Part III

As you'll recall, last month's column featured the first part of our inside look at modern SSB gear. We discussed introductory thoughts on understanding circuit designs and home servicing, plus various means of recognizing your own electronic capabilities or limitations. This month we conclude the mini course with some detailed ideas and proven techniques for analyzing, cross-comparing, and troubleshooting HF transceivers. Our upcoming information is useful for both amateurs interested in self-maintaining their rigs and not-so-technical individuals desiring the best possible insight when purchasing new gear. That ability to study block diagrams and schematics when comparing future rigs has definite benefits over impulsive purchases guided by attractive front panels. Possibly we could compare this to the proverb of beauty being only skin deep, a fact which most of us recognize, and one that also describes amateur gear. Front-panel glamour is nice, but it can also be deceiving.

Personally, I prefer a rig that is stout-hearted enough to take some abuse, yet simple enough so that I can understand its "innards." I don't like a feeling of helplessness if a unit breaks down. If that means buying basic design-type gear in your particular situation, so be it. A confident attitude often results in maximum enjoyment—of autos, amateur gear, or even home appliances. Agree?

Since we obviously can't delve into all of a transceiver's technical aspects in this brief discussion, we've elected to zero in primarily on RF and IF concepts at this time. Techniques of microprocessor control and digital frequency selections are subjects within themselves, some of which have been covered in previous articles. If creditable interest is reported in these areas of 1, 2, 4, 8 band selection with related binary counts being decoded on various boards for "picking up" filters, etc., plus divide-by-N tunings, we'll elaborate on such aspects in a future column. Meanwhile, let's direct our attention to understanding some of those mystifying innards in our modern transceivers.

Relating Block Diagrams, Schematics, and PC Boards

A brief glimpse inside any modern transceiver gives factual proof that a step-by-step approach is the most logical means of understanding and/or servicing these fully packed units. Lacking that insight, a unit can merely be visualized as an amazing and mysteriously functioning product of modern technology. Unraveling those vague areas begins by reading a manual's theory of operation section while following explanations on its related block diagram. Some amateurs use various colored pens for tracing receive, transmit, common oscillators, and power-supplying paths, and for including associated frequencies/bandwidths of circuits within a unit. We heartily endorse that helpful idea.

The previous exercise can provide both basic familiarization with a unit's circuitry and an indication of one's technical limitations. You can then reconsider your own understanding of concepts such as signal frequency conversion (incoming RF to IF, for example), demodulation or product detection (acquiring AF from an IF signal), balance modulators (audio and RF carrier are superimposed, carrier is nulled, leaving double sideband only signal), crystal filters (their narrow bandwidth will pass only one of those sidebands), etc. Assuming you still feel technically competent, actual signal paths within various transceiver "blocks" can now be traced on the unit's schematic diagram. If a signal path or area becomes overly complex, you can refer back to the block diagram, note components (Q6's output goes through noise blanker gate, moves from RF to IF pc board, goes through filter YK88S, and continues through Q1, Q2, and Q3 before reaching the SSB/CW detector, for example), then return to the schematic itself (there's YK88S and Q1, Q2, Q3; now where's the circuit run interconnecting those sections and continuing to D21 through D24?). After you become familiar with a unit's block diagram and schematic, relating associated circuitry to internal pc boards is a fairly easy matter. Large objects such as filters, IF cans, IC's, or variable resistors are used for reference, while resistor and transistor numbers (Q1, R34, etc.) aid cross comparisons.

The previously outline technique of block diagram to schematic correlations can be exemplified with the aid of figs. 1 and 2 (an ideal time to try your illuminated magnifier and colored pens). A TS-430 was picked at random for this particular study only because its schematics evenly fit our page size (no, I do not own a TS-430).

Since the IF board handles a variety of operations, only that section will be considered at this time (note dotted lines of separate boards on the rig's block diagram). Let's begin where the 8.830 MHz receive signal enters the IF board (left top area of fig. 2). That signal moves through YK88S to the bottom gate of Q1, off its drain (top wire), through L2 to bottom gate of Q2, through C26 to Q3, on to L4, and into detector D21 through D24. Looking at both the block diagram and the schematic, an 8.8315 MHz carrier/oscillator signal from the rig's "control unit" enters the IF board's left side and connects to both the SSB/CW detector (via a variable resistor across L4's secondary) and the transmitter's balance modulator (via pin 3 of IC7). Returning to the SSB/CW detector and subtracting 8.8315 MHz oscillator from 8.8300 MHz IF gives 1500 Hz, an audio frequency midway of the IF/filter bandpass. That audio signal progresses through IC1 to Q46 (notch switched off), off that emitter, off the board to the AF gain control, then back in and on to pin 1 of IC5, out via pin 4, and again off the board to the speaker. Notice how every detail is visible on the schematic and how the block diagram helps when you become lost. I've pointed out the AGC and squelch sections in the schematic. Now it's your turn to trace their wirings/actions.

Moving to the transmitter's section, audio from the mike input enters the schematic's left bottom area and proceeds to the base of Q34. That audio proceeds to the input of IC6 (pin 1), out on its pin 3, off the IF board to the mike gain control, back in and to the base of Q38, and on to one input (pin 1) of the balance modulator, IC7. Since an 8.8315 MHz signal is also fed to the other input of IC7 (pin 2), a double-sideband suppressed carrier signal appears at its output (pin 7). If you carefully follow that wire (and our marks), it treks back through filter YK88S (drop one sideband), back "way around" the board to Q41's bottom input gate, and out to Q15 on the RF board. We now invite you to review our presented methods of circuit tracing and apply the concepts to your own amateur transceiver. Remember to refer back to block diagrams as necessary and note "sign posts" items when relating schematics to actual pc boards, and you'll realize maximum insight on your rig's overall operation.

Troubleshooting Amateur Gear

Before one delves headlong into home repairs of amateur gear, it should be

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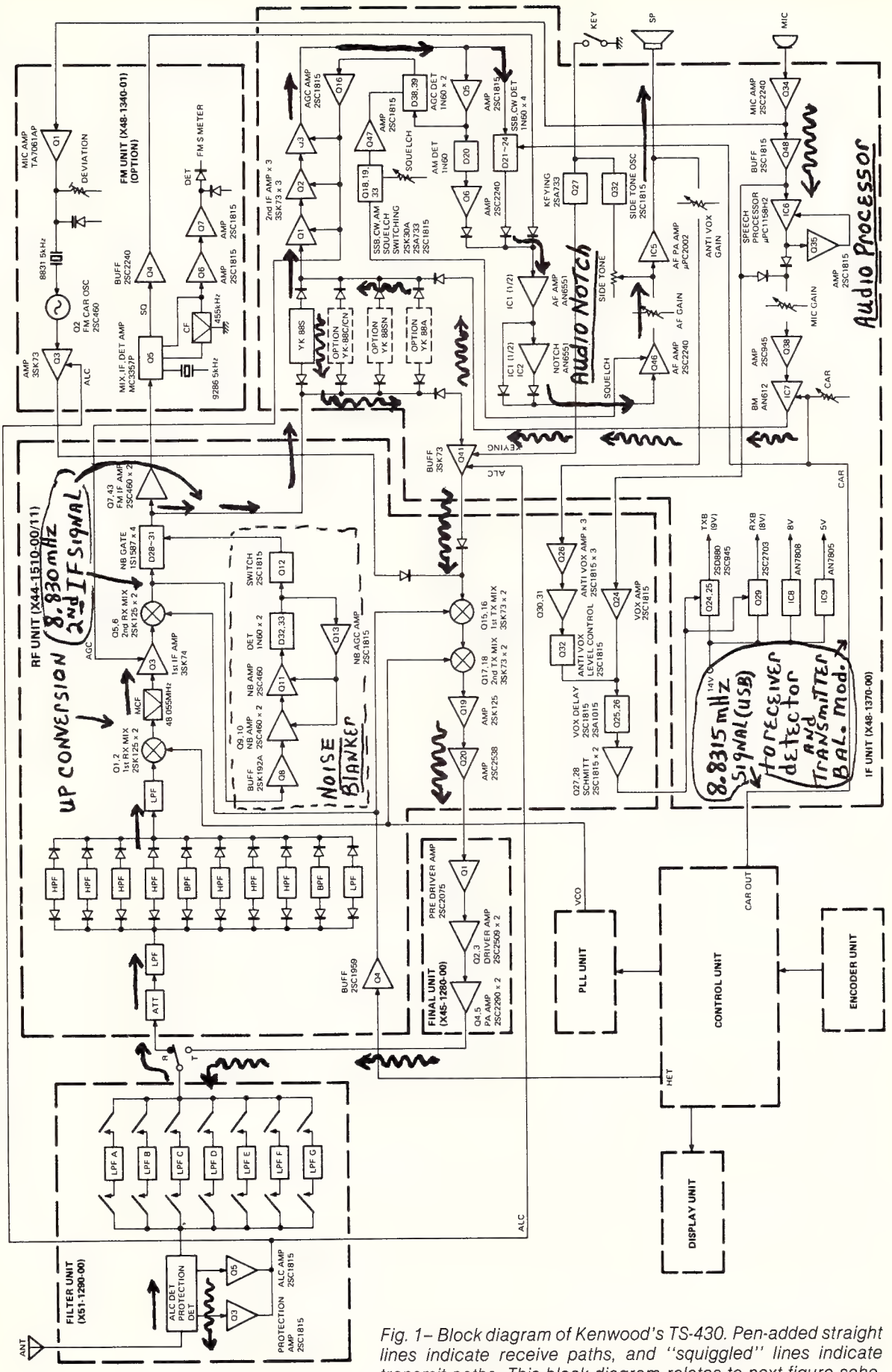

Fig. 1– Block diagram of Kenwood's TS-430. Pen-added straight lines indicate receive paths, and "squiggled" lines indicate transmit paths. This block diagram relates to next-figure schematic. Discussion in text.

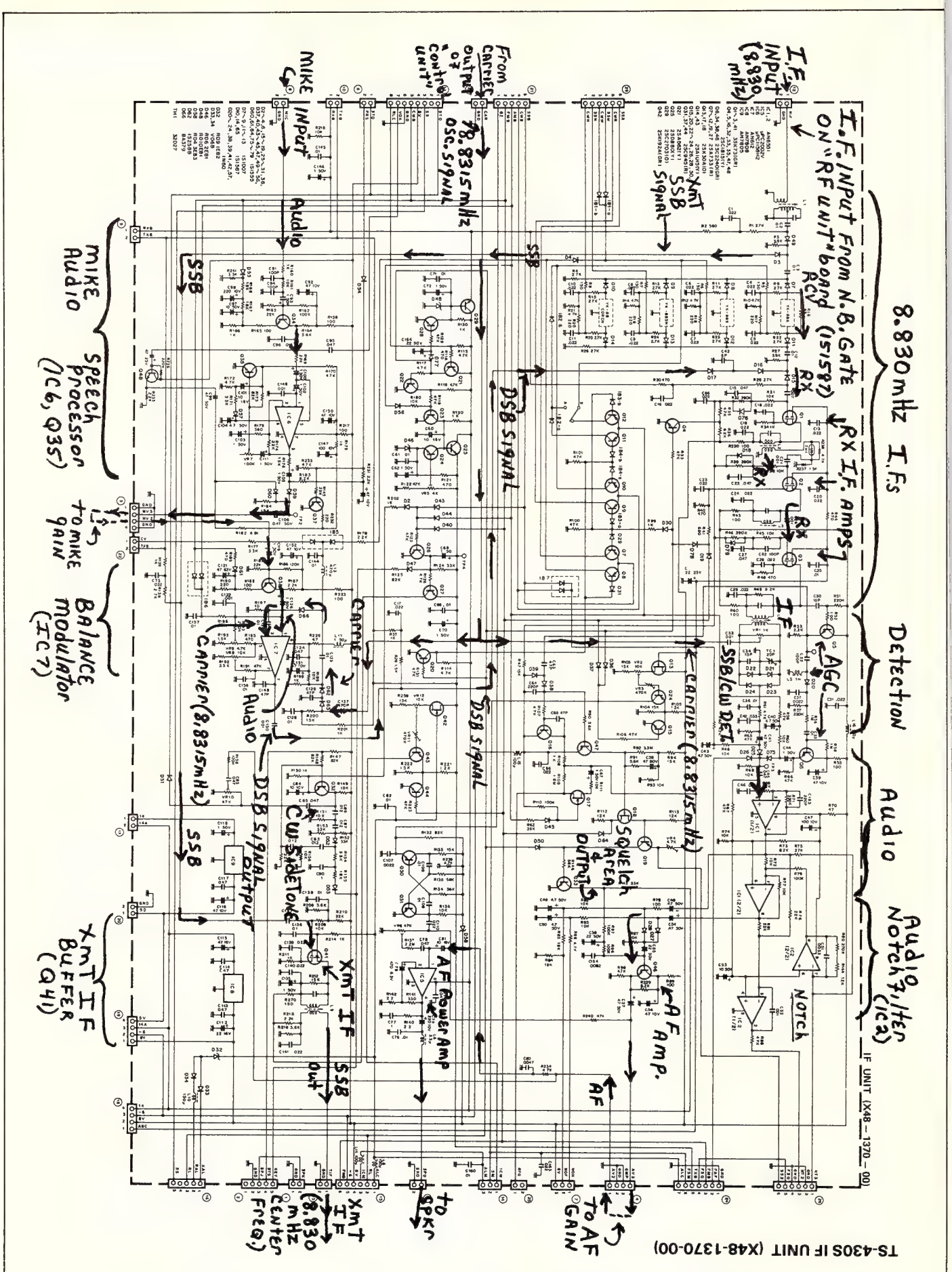

Fig. 2– Circuit diagram of main pc board and IF section in Kenwood's TS-430. Discussion of functions and signals in text.

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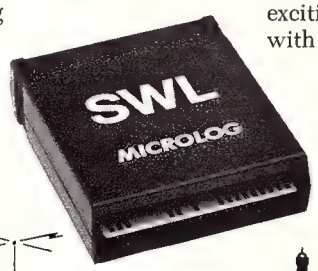

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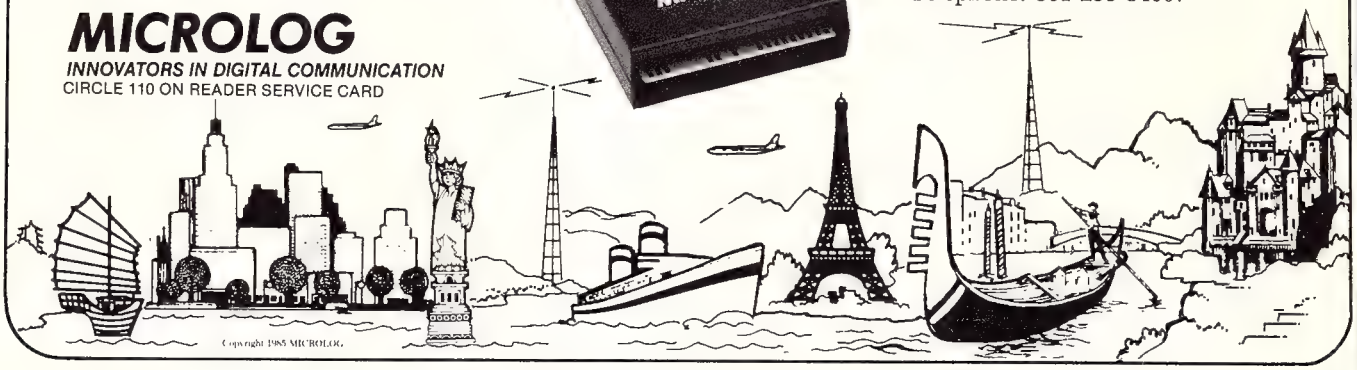

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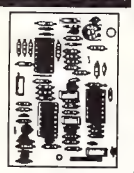

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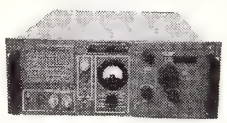

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understood that serious electronic troubleshooting is a time-perfected skill. Likewise, we must also realize that every technician has his own style of analyzing/repairing equipment and changing such success-proven methods isn't always logical advice. In other words, I can outline some well-founded ideas and pointers, but complementing hands-on experience/skill must be acquired on a personal basis.

As a reassuring beginning, remember that a kaput transceiver is usually stifled by a single problem rather than "mass burnout." Replacing a few defective components usually restores smooth operation to that favorite rig. The keynote to that restoration involves mentally dividing the rig into stages (RF, IF, demodulator, AF, etc.), then pursuing a straight-line path for locating "where the signal stops" and uncovering the defective stage. Separate components are then checked/replaced within that stage, and the rig returns to operation.

The sophisticated nature of today's transceivers can be advantageously used for determining internal areas or stages with problems. We merely study the rig's block diagram, use "common reasoning," and let the unit itself describe its ailing section. Assume, for example, a rig transmits perfectly (full output, good quality audio, etc.), but receive sensitivity is very low (no S-meter readings, low audio, etc.). First, a double check here. Is the antenna in known good shape? Are front-panel switches set correctly? Does another (preferably similar) transceiver perform better when connected to the same antenna cable? Remember our previous note: Don't Assume Anything! Check everything fully (this step is the most often overlooked). Next consider block-diagram facts. What receiver stages are not used for processing (IF level) transmit signals? This step can narrow troubles to receiver RF and IF stages and support sections. Depending on a unit's design, the RF attenuator and noise blanker can be used for further narrowing the search to "before" or "after" their connected sections. Beyond this point one might consider clip-lead connecting the antenna to various stage inputs "up to" the first mixer and noting receiver performance (a sudden burst of signals obviously indicates you've "crossed" the defunct stage). Assuming the problem still exists, the defective area has been narrowed to a minimum number of stages, and IF signal injections are logical continuing steps. Assuming a local friend has an identical model rig, "cross connecting" stages may prove ideal here. Capacitors are used for blocking DC while passing RF signals (a .01 mFd is fine), and a known-good IF signal is injected from the working transceiver to that same point on the ailing rig. If one carefully respects frequencies, levels, and wirings, this technique is quite useful. Whatever method or concept you adopt, remember that both transmit and receive signals follow a series path through a transceiver, and you should follow a similar "straight ahead"/stage-by-stage pursuit for locating malfunctions. Think logically, maintain patience and perseverance, and keep alert to your own technical limitations.

Conclusion

Although the ideas and techniques discussed in our two-column feature were general in nature, their concepts can be applied to almost any transceiver or any type of equipment problem. If you understood my explanations, you can also visualize ways of expanding on those ideas. If you didn't understand my explanations, you know to avoid delving that deep into home repairs. Reread that last sentence. It made an important point. Incidentally, the information presented in this two-part article is comparable to a rather expensive mini-course in amateur radio electronics. Maybe you should reread the whole thing another time for maximum benefit. Chances are good you'll find something useful that you missed previously.

There are both advantages and disadvantages to home-servicing amateur gear, and that situation should be recognized before delving inside modern units. Assuming such servicings are within one's range of technical abilities, possible consequences of cross-country shipping entanglements and delays are minimized. Original equipment owners also exhibit the most tender and meticulous care of their prized possession. On the other hand, trained service technicians are usually familiar with various equipment idiosyncracies or common problems and can usually perform repairs (especially those of a heavy technical/serious nature), while we "operators" are still involved in studying schematics and board layouts.

You know, the fact that we're licensed *amateurs* doesn't necessarily mean that we understand the full internal designs of our equipment. The more we know about our units, however, the greater merit we reflect to both ourselves and our society overall. How can we be expected to know or understand how a rig functions, or generally how to keep it functioning, if we are not shown, right? This column/series has been a departure from the usual "enjoy it and forget how it works" attitude that's occasionally noticed in today's world. Your thoughts and opinions on this special column feature will thus be appreciated, closely evaluated, and used for considering similar future columns.

73, Dave, K4TWJ

PRINCIPLES, PRACTICES, AND PROJECTS FOR THE VHFER

A Tale of Two Preamps

As reported in this column for August, I purchased two new GaAsFET preamps at the Dayton Hamvention and intended to run them through their paces, both on the air and in the lab, and report the results. True to my promise, I have used these products on the air and spent some time making performance measurements on them in a local RF/microwave lab, and can now report my findings.

I'll break up my preamp report into two columns, with this one focusing on the laboratory evaluation of the Microwave Components of Michigan MGF1202 preamplifier for 144 MHz and a "surprise" evaluation of the Advanced Receiver Research (ARR) Model P432VDG preamplifier for 432 MHz. I say "surprise," because I hadn't intended to review this unit. I don't own the review sample. Pete, KT2B, gave it to me when he heard that I had some lab time coming up. The ARR unit, like the MCM unit, was new and unused, straight from the factory.

MCM is operated by Norm Alred, WA8EUU, whom I found selling preamps and other interesting components at the Dayton Hamvention. I don't know if this is his full-time occupation or just an avocation. In any case, he builds a nice-looking preamp in an anodized aluminum "Eddystone" type case with type N input/output connectors and a simple feedthrough capacitor for application of DC power. ARR is operated by Jay Rusgrove, W1VD, and I know that this is indeed a full-time business. ARR offers a broad range of VHF/UHF microwave RF products, but is most famous—at least in amateur circles—for its GaAsFET preamplifiers, which are offered in frequency ranges from 50 through 432 MHz. The ARR preamps are very tiny, built in anodized aluminum, RF-tight cases using BNC input/output connectors.

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I tested each preamp for gain/bandwidth characteristics, nominal gain, DC current drain, noise figure, and 1 dB compression point. I did not have the facility to test the third-order IMD performance, and although I could have measured the input and output impedance of each preamp, I neglected to do so. The preamps were tested "as received" from their respective factories with no field tuning; all tests were performed with "pure" 50 ohm sources and terminations. Recorded data was taken with DC input voltage of 12.0 volts, but I did run the power supply down to 0 VDC to monitor the point at which preamp performance degraded.

The MCM preamp DC connection was a bit annoying in that there is no factory-provided ground terminal. Normally, this wouldn't bother me. I'd simply assume the DC return was through the coaxial cable shields. But with GaAsFET devices being notorious as they are for sensitivity to static transients, I'd recommend anyone using such a preamp have a direct, soldered ground return to the power supply. To prevent potential problems, I clipped a ground lead to the case of the MCM preamp before commencing any tests. The ARR preamp has a ground terminal provided.

When I met Norm Alred at Dayton and discussed his preamps with him, he made a distinct point of mentioning that his preamp has narrower bandwidth than other popular GaAsFET preamp designs on the market. This should, he said, help to reduce the overload from out-of-band sources. He also pointed out that his preamp has two bias adjustments to allow for better field optimization of performance (noise figure versus gain). These two bias adjustments are variable resistors in both the drain lead and the source of the MGF1202. In measuring the gain/bandwidth performance of the preamp, I did not find the circuit to be particularly narrow-band: the 3 dB points are 45 MHz apart, resulting in a 31.2% bandwidth. See the gain:bandwidth plot for the whole story. The MCM preamp appears to have a bit of a high-pass characteristic, with a steep skirt on the low-frequency side of center and a much more shallow skirt on the high side.

Advanced Receiver Research makes no claim for the bandwidth of their product, but the 432 MHz model evaluated is actually quite narrowband, with 3 dB points separated 82 MHz, or a 19% bandwidth. Again, no field adjustments were made. These products were tested as received. The ARR P432VDG had its response centered on 408.3 MHz rather than 432 MHz, but the gain at 432 was only −1.2 dB from that peak. Presumably, the folks at ARR adjust for minimum noise figure and don't scrutinize each preamp for gain centered on the frequency of interest. No harm done, as the ARR preamp offered 16.8 dB gain—enough to

Fig. 1– The Gain:Bandwidth plot for the Microwave Components of Michigan 2 meter GaAsFET preamp.

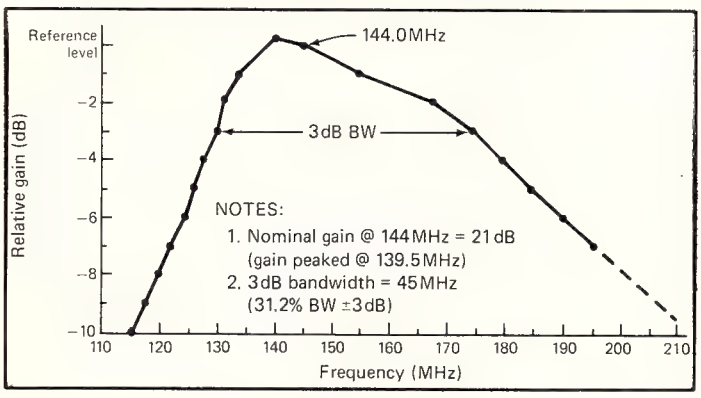
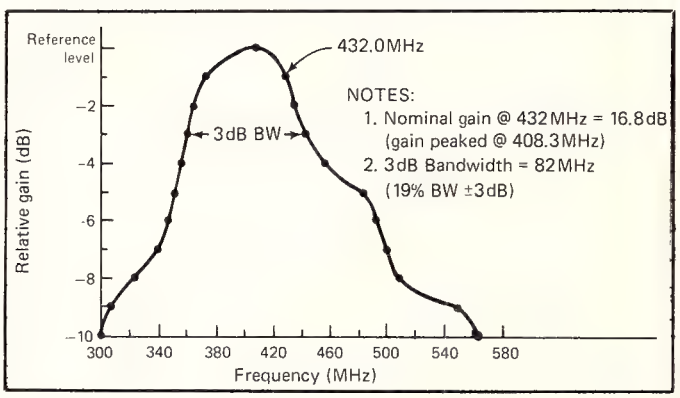


Fig. 2– The Gain:Bandwidth plot for the Advanced Receiver Research (ARR) Model P432VDG preamp.



Impressive antenna farm at JE1RXJ. Takeshi is equipped for operation from 3.5 through 432 MHz, but is mainly active on 6 meters. VHF antennas include 6 elements for 50 MHz at 80 feet and 15/15 elements at 52 feet for 70 cm. JE1RXJ intended to operate the new CQ WW VHF WPX Contest in July.

override the noise in most systems—at 432 MHz. The MCM preamp had its gain centered at 139.5 MHz, with the gain at 144.0 MHz, only −0.5 dB from peak. The MCM product offered just about 21 dB gain, surely enough to override the noise in even a poor receiving system.

The noise figure of each preamp was measured using a tried-and-true Hewlett-Packard model 340 automatic noise-figure meter and then verified by calculation using an MDS measurement in a precise 1 kHz bandwidth. In each case I achieved nearly perfect corroboration between NF measurement and calculation. The MCM preamp, claimed to achieve 0.38 dB NF at 144 MHz, measured nearly exactly that figure; the ARR preamp, stated to offer <0.5 dB NF, measured 0.65 dB. Rather than groan about the 432 MHz device not meeting its spec, I'll assume that the losses in my measurement system might account for the 0.15 dB difference.

The 1 dB compression point is a valuable figure of merit for any amplifier. By the time an amplifier's output compresses 1 dB with respect to the input signal, it is notably nonlinear and invariably produces considerable harmonic distortion. The MCM product does not have a claimed 1 dB compression point figure, while the ARR preamp has a published +12 dBm (about 17 milliwatts!) 1 dB compression point. I made this measurement on each preamp using a Boonton Electronics Model 102F signal generator, Model 42A microwatt meter, and Hewlett-Packard 8554/141T spectrum analyzer. According to my measurements, the MCM preamp exhibited a +8 dBm compression point, and the ARR preamp showed a +7 dBm compression point. Harmonic distortion from both preamps was terrible at these levels, with the second harmonic (288 MHz for the MCM product and 864 MHz for the ARR) rising faster than the third. A 10 dB degradation in the second harmonic occurred at −20 dBm input (+1 dBm output) with the MCM product, and similar degradation occurred at −26 dBm input (−9 dBm output) with the ARR unit. A 10 dB degradation in the third harmonic occurred at −16 dBm input (+4.5 dBm output) with the MCM, and −20 dBm input (−3 dBm output) with the ARR products. Whether this increase in harmonic distortion from the preamplifiers actually has any noticeable affect on system performance depends largely on the stages that follow. It is undesirable for the mixer to be saturated by in-band signals, as spurious mixing

products and system degradation are likely to occur.

DC current drain of both preamps is very low—10–15 mA. Apparently, both the MCM and ARR products have internal voltage regulators which allow a wide range of DC input voltage. I applied voltages from 15 VDC to nearly 0 volts to see where these internal regulators ceased performing their function. The MCM preamp showed no change in performance during the 1 dB compression test down to a voltage of 7 VDC. The ARR preamp showed no change down to 5 VDC. Below these "lower limit" voltages, the preamp outputs fell dramatically and harmonic distortion produced became intolerable.

The MCM 144 MHz preamp showed signs of instability during laboratory testing. It oscillated, producing a wide spectrum of signals from about 150 MHz to higher than 1.2 GHz, when its input port was left unterminated. In fairness to MCM, their instruction sheet does recommend a coaxial relay switching scheme which always terminates the preamp input with a 50 ohm pure impedance (see this column for August, page 66, fig. 1 for details). Also, I don't know that this oscillation harms anything. The ARR preamp seemed unconditionally stable and did not oscillate with its input unterminated.

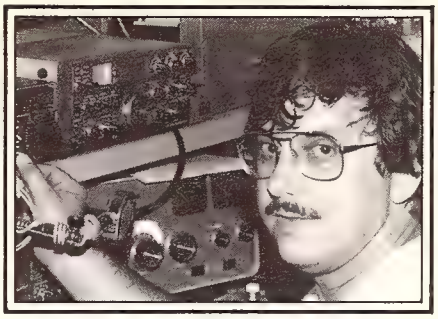
The Microwave Components of Michigan product is available from the manufacturer in kit or wired form. Their address is 11216 Cape Cod, Taylor, MI 48180. The Advanced Receiver Research product is available from the manufacturer only in wired and tested form. Their address is Box 1242, Burlington, CT 06013.

In a future column I'll review the SSB Electronics DX1296S GaAsFET preamp for 23 cm and my brand-new ARR 50 MHz high-performance receiving converter, Model R50VDA with its accompanying P50VDG GaAsFET preamp for 6 meters.

Fun From Fair

I'm always astonished when I come across a fellow amateur who isn't familiar with Fair Radio Sales, the veritable mecca of homebrewers and experimenters everywhere. Fair Radio has been in business nearly 40 years, specializing in government and commercial electronic surplus and offering what I've always considered excellent and honest service. Not being associated with the company, I'm really not sure who runs the show. It is obvious that they have amateurs on staff, since frequent references to amateur radio applications and publications appear throughout their catalogs.

As a homebrewer, I've used Fair Radio as a major source for all kinds of electronic parts, from power transformers to panel meters. But they also sell complete radio sets, assemblies, and subassemblies of every conceivable variety, including much that would interest VHF/UHF enthusiasts eager to conquer new frontiers.



Ivars Lauzums, KC2PX, of Belle Mead, NJ. It was from Ivars' QTH that club group NV6O/2 operated the first CQ WW VHF WPX Contest July 20–22, 1985. Photos of the contest operation itself will follow in the November column.

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- A complete (minus power supply and blower) tripler/amplifier for 400–600 MHz using two 4X150-series tubes and capable of generating 300 watts output on the 70 cm amateur band: Type AM-1178/GRC, $75.00.
- A complete (minus power supply and blower) power amplifier for 50–100 MHz using a 4X150A, capable of generating 300 watts output on the 6 meter amateur band: Type AM-1180/GRC, $49.50.
- A really complete (including everything) power amplifier for 120–152 MHz using an 8122 tube, capable of generating 300 watts output on the 2 meter amateur band: Type AM-4351/GR, $195.00.
- An RF changeover relay with type N connectors and coaxial housing (similar to Dow-Key), good for 500 watts at 70 cm: Type #123-0100-400, $12.95.
- An 8 foot diameter parabolic dish antenna, aluminum mesh, with 2 GHz feedhorn and yoke, but could be modified for 23 cm with little effort: Type AS-554/TRC, $350.00.
- An SPDT (remote) coaxial switch with type LT connectors, rated to 1 kW through 5 GHz: Type #C14K2CA, $27.95 new.
- Coaxial cable, MIL-R-17A ("mil spec") RG-8/U, new, $200/1000 feet.

Not listed in their latest catalog, but previously procured from Fair Radio and probably available again in the future, are items like:

- A complete (minus power supply and blower) mixer/power amplifier for 1.3–1.8 GHz using 3 type 7289/3CX100 tubes, capable of generating 50 watts ouput on the 23 cm amateur band after minor modification: Type AM-3204A/TRC, about $100.00.
- Tunable bandpass filters, cavity type, in ranges to cover all the VHF amateur bands; these are capable of handling a few hundred watts and exhibit 1 dB passband loss with steep skirts to reject adjacent bands: type F194/U covers 142-163 MHz, type F198/U covers 205-224 MHz, about $22.00.

The list of unique gear goes on and on. I've used a lot of this stuff with great success. Some equipment requires minor repairs or modification, but most works fine nearly out of the box. Fair Radio has always been very "fair" with me, in that any complaints were quickly resolved to my satisfaction. There are other surplus houses, and I'm sure some of them are terrific, but Fair Radio goes out of their way to cater to amateurs and our crazy requirements. For their latest catalog, write to these folks at P.O. Box 1105, Lima, OH 45802.

Rebel With a Cause: Rich Whiten, WB2OTK

I'm pleased for this opportunity to introduce Rich Whiten, WB2OTK, of Piedmont, SC to our readers. Having known Rich since 1970, the year he was first licensed, I know he is very dedicated to furthering the causes of amateur radio and VHF/UHF in particular.

Rich Whiten, WB2OTK, sitting comfortably in his well-equipped VHF shack. Rich has worked all 50 states on 6 meters, plus 38 states on 2 meters, in just 2 years from his QTH in northwest South Carolina. He's also worked 24 states on 70 cm, using just 10 watts output power, since September 1984!

Rich has operated the VHF bands for 15 years, first from Poughkeepsie, NY, then from Jacksonville, FL, and now from his South Carolina QTH in a rare grid square EM84. He's long been a 6 meter enthusiast. I remember the days when Rich installed a pair of stacked 6-element, 24 foot long Yagis on a tower mounted to the roof of his house near Poughkeepsie. As if that wasn't tempting fate enough, he followed with a 4-bay array of 16-element, 21 foot long Yagis for 2 meters (64 elements total) on that same roof tower! From a rather poor radio location apparently several hundred feet *below* average terrain, Rich proceeded to work all kinds of DX on 50 and 144 MHz, proving that dedication is probably the most important ingredient for success.

In the mid-1970s, I would stop by Rich's QTH in New York to see what new tomfoolery was engaging him, and we would spend an hour or so playing tennis,

The DX is better out here. Ask anyone who owns an FT-726R.

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FT-726R owners know. You'll find them working the world from their apartments. Attics. And from their antenna-restricted neighborhoods.

They'll even boast of a signal quality and DX potential that would make any 20-meter operator envious. Regardless of where we are in the sunspot cycle.

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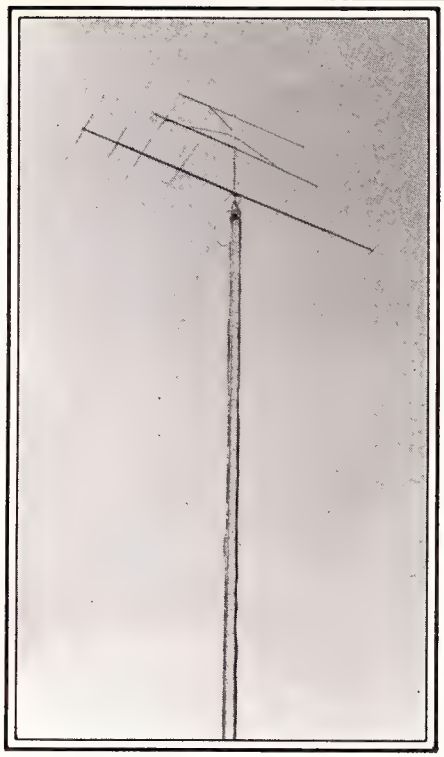

The 100 foot tower and VHF antennas at WB2OTK, Piedmont, SC. Rich has installed 8 elements (on a 37 foot boom!) for 6 meters at 100 feet, plus a 19-element "Boomer" for 2 meters at 115 feet and a 24-element "Boomer" for 70 cm at 125 feet. He had also planned to install 4 stacked 5-element beams at 20, 40, 60, and 80 feet, aligned northeast and fed in phase (16 dBd total gain) for 6 meter work in the CQ VHF WPX Contest. That should produce quite a signal.

Six and 2 meter amplifiers at WB2OTK/4. The lower unit is an 8877 and accompanying power supply for 144 MHz, and the unit sitting atop the rack cabinet is a 4-1000A for 50 MHz. Both run the legal power limit.

a game at which Rich excels and at wh I'd usually be trounced. Then Rich mo to Florida, where he probably progres even further with his tennis skills where he began an exciting new car chasing (and working) more VHF E-s than we Northerners are accustome hearing. Tiring of Jacksonville, the W ens relocated once more, this time to Greenville, SC area. In just two yea WB2OTK has worked 50 states on 6 m ters and 38 states on 2 meters from SC location. As if this weren't impress enough, he's also worked 24 states on cm as of this writing (mid-July) *si September 1984*, just 9 months ago. A all 70 cm work has been done with just watts output!

All this success doesn't come with some work, and Rich has poured a go deal of effort into his antenna system elements at 100 feet for 50 MHz, 19 e ments at 115 feet for 144 MHz, and 24 ements at 125 feet for 432 MHz, all with ⅞ inch hardline. Whiten has a spent a lot of time constructing high-po ered amplifiers for the 50 and 144 M bands, where he runs the legal power li it. The station equipment at WB2OTK cludes a Drake TR-6 transceiver for 6 m ters, with any of 3 different legal-limit a plifiers (a 4-1000A, 8877 or pair 4-400A's). The TR-6 drives a Drake TC transverter and an 8877 amplifier for 1 MHz. The 432 MHz setup is a Drake TR transceiver with a Microwave Modul MMT432/28S transverter. The 2 met and 70 cm receiving converters are pr ceded by GaAsFET preamplifiers, a Rich intends to have a power amplifier f 432 by the time this reaches print.

To supplement his 6 meter antenn farm, Rich intends to install a 24-eleme array of four 6-element beams at 20, 4 60, and 80 feet above ground, fed phase and fixed toward the northeast. A though his home sits at a ground elev tion of about 950 feet above sea leve Rich says this is not particularly high f the area. Sassafras Mountain, the hig est point in South Carolina, is just 3 miles away, while Mt. Mitchell, North Ca olina, the highest peak east of the Missi sippi at 6684 feet, is just 75 miles to th north of Rich's location. Despite thes obstacles, WB2OTK does very well o the VHF/UHF bands, having worked 3 states on 2 meters within 6½ weeks moving into his new home in Piedmon Rich worked DX such as New Mexic (KA5EBL, some 1260 miles to the west) i his first few weeks on 144 MHz, and wa busy working Minnesota on 432 MH when I called him on the telephone th evening of July 8 to advise him that 2 me ters was open! Some guys have all th luck.

WB2OTK was recently the subject o some unfortunate publicity regarding nu merous TVI complaints against him re ceived by the FCC's Atlanta field office The TVI was apparently the result of Rich

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transmitting on 2 meters at *any* power level, with *any* equipment, and Rich is totally convinced the problem lies with the local cable operator's lack of effective shielding and decoupling within his system. Whiten says the cable leakage (RF radiation) in his neighborhood is a real problem which noticeably degrades his own 144 MHz receiver's ability to detect weak signals. I hope that by the time this is published, all of Rich's (and his neighbors') TVI problems are solved.

The First Annual CQ WW VHF WPX Contest

This is being written only a few days after our first *CQ* VHF WPX Contest, and I have not as yet received comments from participants, other than the few heard on the air during the contest. I had reported in the July column that I'd personally be active with a multi-op group in northern New Jersey, using the call K2XR. Well, this turned out to be half true. I was active from New Jersey, but we decided to use the call NV6O/2, a much "rarer" prefix than K2! Eric, NV6O, is a new member of our S.C.O.R.E. contest club, and he is a permanent NJ resident. Using his call seemed only proper for a prefix contest, and I'm glad we had the opportunity to be "rare" in a VHF contest. We set up a multi-multi QRO (high power) station at the QTH of KC2PX in Belle Mead, NJ and made 672 QSO's with (preliminary count) 217 prefix multipliers for a total score of about 170K points.

The WPX Contest was a lot of fun for us. We had some terrific tropo on 2 meters Friday night and made numerous contacts with Ohio, Kentucky, North Carolina, and South Carolina, all areas more than 400 miles distant. Saturday offered excellent E-skip on 6 meters, allowing us to work nearly all the 48 continental states during the 4-hour opening. We had good meteor scatter Saturday morning, making a dozen m.s. QSO's in one hour on 50 MHz. Ironically (but not surprisingly), our first scatter contact was with WB2OTK/4 in South Carolina. The weather was very hot and humid here in the northeast, and we took advantage of KC2PX's in-ground swimming pool to cool off when activities slowed down.

We were disappointed with activity on 220 MHz (what else is new?), where we made a measly 16 QSO's during the contest period. Of course, some of this poor performance was our own fault. During the Friday evening activity hour, our 220 MHz receiving converter wasn't connected (pilot error). At NV6O/2, we made 257 QSO's on 6 meters, 331 QSO's on 2 meters, 54 QSO's on 432, and 14 QSO's on 1296, in addition to the 220 total reported. I was very happy to hear NA1L—a good prefix—on the air, operated by W1XX of the ARRL. K1TR, AA2Z/1, and a few others were expending great effort to work up good totals from New England. WS4F in Georgia and W5HUQ in Florida were very active on 6 meters and had good totals when last heard. KQ3R in Pennsylvania was doing a wonderful job on all five bands: this is Tom Waldrin, proprietor of the VHF Shop, a *CQ* advertiser.

I heard some complaints during the contest: too long a contest period; not enough promotion; not enough activity; date too close to the ARRL contests; and so forth. These are good inputs, and I hope some of these comments are reported in writing from participants. A brand-new contest can't be perfect, and we didn't expect it to be. But we were gratified at the activity levels, especially considering the intense heat of the weekend, and look forward to making constructive changes in the contest. If *you* have not yet made known your comments re the VHF WPX contest, please write to us and tell us what you think.

A Plea

Readers have written asking why this column favors reports about east-coast operators and happenings. This question deserves an answer. It is because I can only report on what I receive from readers! *Please*, wherever you live, write to me and let me know what's going on in *your* area. Tell me about your own station, activities, local band conditions, anything. Let me know if you've purchased a piece of VHF/UHF equipment with which you are especially pleased—or displeased—and tell me why. Inform us of your homebrew projects and developments. Send photographs! Your correspondence needn't be formal. Jot something on a postcard, a QSL card, a piece of tree bark. If the information is readable and interesting, I'll do my best to include it in this column. Thanks.

73, Steve, WB2WIK

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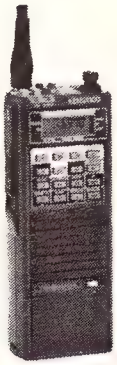
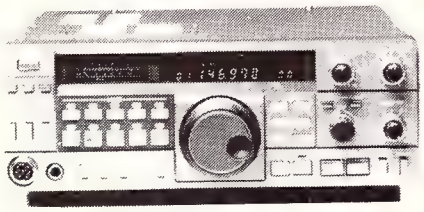


Kenwood TR-2600, TR-3600



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Announcing

•**Radio Exams in Wilbraham, MA** – The Hampden County Radio Assn. will administer exams for all classes of amateur radio license on October 18th at the Hampden-Wilbraham Regional High School, 621 Main Street, Wilbraham, Massachusetts at 9 am. Interested candidates should obtain form 610 by writing to the club. If you currently hold an amateur radio operator's license, you must bring the original and a copy. There is a $4.00 charge to test above the beginner's level. Make checks payable to the "ARRL/VEC." Completed applications should be mailed to: Yorke Phillips, 235 Ames Rd., Wilbraham, MA 01036. You may also sign up that day (arrive at 8:30 am). If you are interested in becoming a radio amateur, classes will be held in the fall. Drop a postcard with name, address, and phone number to Hampden County Radio Assn., P.O. Box 482, West Springfield, MA 01090.

•**Association of Latin American Radio Experimenters** – This national organization of amateur radio experimenters is open to hams who can speak Spanish or Portuguese as natives and want to communicate with each other in these languages. The group is seeking members across the country to open chapters. Various nets are being established nationwide and charter members will be given special recognition. For information send SASE to Dr. Richard A. Sandell, WD6EXJ, Executive Director, ALARE, 2250 Boston Post Road, Larchmont, NY 10538.

•**Amateur Radio Classes in Agawam, MA** – Radio classes being sponsored by the Hampden County Radio Assoc. at the Agawam High School will be held this fall for the Novice, Technician, General, Advanced, or Extra class licenses. There is no charge for the course, but you must purchase the textbooks, which cost under $10. Classes will last for ten weeks, meeting once per week from 7–9 pm. Testing for all license grades will conclude the course. To find out more or to sign up, contact Art Zavarella, at 413-786-9115, or drop a card to Hampden County Radio Assoc., P.O. Box 482, West Springfield, MA 01090. (Include your phone number.)

•**Hermiston ARC's KD7LC** – KD7LC will be on the air from Hat Rock State Park, OR on Oct. 12 from 1800–0100Z and Oct. 14 from 1800–2200Z on the General phone and Novice CW bands, with some 2 meter and 440 MHz operation. Send contact number and a 9 × 12 SASE for a certificate to HARC, P.O. Box 962, Hermiston, OR 97838.

•**Lexington, North Carolina** – The Healing Springs Mtn. VHF Society will operate WD4BBQ for the Lexington Barbecue Festival on Oct. 26 from 1300Z–2100Z on 40, 20, and 15. Phone: 25 kHz up from edge of General class band. Novice band: 7125 kHz as time permits. Also area 2M repeaters. Special Bar-B-QSL. SASE only. Mail to: Healing Springs Mtn. VHF Society, P.O. Box 41, Lexington, NC 27293-0041.

•**Dutch Amateurs From Guernsey** – From Oct. 23–30 the following Dutch amateurs will be active from Guernsey (GU0): PA0TUK, PA2FAS, PA3AWW, PA3CJF, and PE1FNB. They will use the callsign GU0/PA2FAS and work all bands from 10–160 meters, both CW and phone. Crossband, WARC band, and split on request. QSL via: DAGOE, P.O. Box 356, Dordrecht, Holland or via PA-buro.

•**WD4KOW From Sunbelt Expo** – The Colquitt County Ham Radio Society will operate club station WD4KOW from the site of the Sunbelt Agricultural Exposition on Oct. 15, 16, and 17 from 0900 to 1700 EDST each day. The Sunbelt Expo is held at Spence Field Airbase, near Moultrie, Georgia. Operations will be in the general portion of the HF bands. The members will also be on the local repeater 146.19/.79. A special QSL card is available for those making contact during this event and submitting a SASE to Colquitt Ham Radio Society, P.O. Box 813, Moultrie, GA 31776.

•**Hot-Air Balloon Fiesta** – The annual International Hot-Air Balloon Fiesta at Albuquerque, New Mexico will be Oct. 5–13. Special-event station KN5D will be operating on 29.600 FM, 28.625, 21365, 14.285, 7280, 3940, or 1840 kHz SSB. They also plan to operate a Gateway station through OSCAR 10 on 145.885–145.895, conditions permitting. QSL to KN5D, P.O. Box 997, Corrales, NM 87048.

•**W3DQI From Laurel, MD** – The Laurel Amateur Radio Club will operate special-event station W3DQI from 1500–2230Z to celebrate the anniversary of the restoration of the Montpelier Cultural Arts Center in Laurel, MD. Frequencies: lower 25 kHz of General bands on 75, 40, and 20 meters. Also 147.54 MHz simplex. Send SASE for 8″ × 11″ certificate. QSL to LARC, P.O. Box 91, Annapolis Junction, MD 20701.

•**The following hamfests, etc., are slated for October:**

Oct. 4–6, **1985, ARRL National Convention,** Louisville, KY. Contact the Greater Louisville Hamfest Assn., P.O. Box 34444, Louisville, KY 40232 (502-368-6657).

Oct. 5, **9th Annual Mid-Atlantic VHF Conference,** Warrington, PA. Contact Hamarama 85, P.O. Box 311, Southampton, PA 18966, or call Lee A. Cohen, K3MXM, at 215-635-4942.

Oct. 5, **RAGS Hamfest,** New York State Fairgrounds, east of Thruway Exit 39. Contact Viv Douglas, WA2PUU, P.O. Box 88, Liverpool, NY 13088.

Oct. 5, **CQ Radio Club of Torrington, Fleamarket,** Watertown, CT. Contact Donald D. Taylor, KA1GKJ, P.O. Box 455, Watertown, CT 06795.

Oct 5–6, **Mississippi Coast ARA Hamfest,** Biloxi, MS. Contact Mississippi Coast ARA, P.O. Box 1785, Gulfport, MS 39501.

Oct 6, **Yonkers Electronics Fair and Fleamarket,** Yonkers, NY. Contact Yonkers ARC 914-969-1053.

Oct. 6, **Computer Central Show and Swap Meet,** Des Plaines, IL. Contact Computer Central, 1506 Central Ave., Deerfield, IL 60015.

Oct. 6, **Springfield Hamfest and Computer Expo,** Springfield, OH. Contact Independent Radio Assn., 513-322-8236.

Oct. 6, **Southeast Iowa Hamfest,** West Liberty, IA. Contact Tom Kramer, KE0Y, 905 Leroy St., Muscatine, IA 52761 (319-264-3259).

Oct. 13, **Lima, Ohio Hamfest,** Lima, OH. Contact NOARC, Box 211, Lima, OH 45802.

Oct. 13, **Ham Fair 85,** Lansing, MI. Contact Rowena Elrod, KA8OBS, 111 Lancelot Place, Lansing, MI 48906 (517-482-9650).

Oct. 19, **Tri-Cities Hamfest,** Gray, TN. Contact Tri-Cities Hamfest, P.O. Box 3682 CRS, Johnson City, TN 37601.

Oct. 19, **SPARC Swapmeet and Packet Exhibit,** Lee County Fairgrounds, Opelika/Auburn, AL. Contact Ray at 205-745-2838.

Oct. 19, **Austin ARC Fall Swapfest,** Manchaca, TX. Contact Jim Strohm, KA5UXC, 1743 Cricket Hollow Dr., Austin, TX 78758 (512-837-5423)—SASE.

Oct. 26, **Tri-City ARC Auction,** Poquonock, CT. Contact WA2RYV at 203-464-6555.

Oct 26–27, **Hamarama 85,** Lake Texoma, OK. Contact Texoma Hamarama Assn., P.O. Box 610892, DFW Airport, TX 75261.

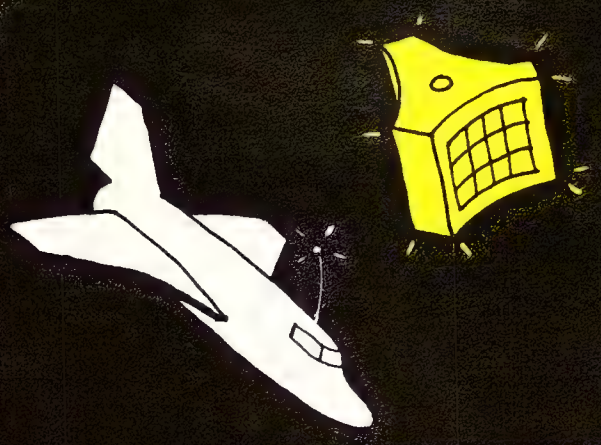
Oct. 26–27, **Hamfest Chattanooga,** Chattanooga, TN. Contact Hamfest Chattanooga, P.O. Box 3377, Chattanooga, TN 37404, or call N4DON at 404-820-2065.

Oct. 27, **Kalamazoo ARC Hamfest,** Kalamazoo, MI. Contact KA8RUA, 2825 Lake St., Kalamazoo, MI 49001.

Oct. 27, **Heart of Ohio Ham Fiesta,** Marion, OH. Contact Ed Margraff, KD8OC, 1989 Weiss Ave., Marion, OH 43302 (614-382-2608).

Oct. 29, **RF Hill ARC Hamfest,** Sellersville, PA. Contact Robert Garland at 215-674-4800 (ext 515, days) or 215-721-0278 evenings.

Nov. 1, **Hampden County Radio Assn. Radio/Electronics Auction,** Feeding Hills, MA. Contact Ron Beauchemin at 413-739-5228.



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THE CANADIAN AMATEUR magazine carries up-to-date Canadian regulations for DXpeditioners to VE/VO/VY, columns on DX, AMSAT, VHF/UHF, Microwaves, packets, contests. Technical projects, serialized books, tutorials. Eleven issues $20, Box 855, K6A 3C9 Canada.

ROSS $$$$ NEW SPECIALS (October only): If you don't see what you want, send Call letters, name & phone # for personal price quote. Over 6500 ham-related items in stock. CALL-BOOK US OR FOREIGN $14.00. ICOM # IC-735 $729.90, IC-45A $287.90, IC-745 $768.90, IC-04AT $295.90, IC-701 $529.90, KENWOOD # TS-940S/WAT $1699.90, TH-21AT $194.90, TR-7930 $303.90, TR-7950 $356.90, TS-430S $689.90, TM-211A $299.90, TR-8400 $349.90, TW-4000A $494.90, TS-660 $759.90, YAESU # FC-102 $239.90, FT-757GX $698.50, FRG-7700 $369.90, FRG-8800 $589.90, FRG-9600 $486.90, FT-230RT $279.90. All major lines stocked, L.T.O. MENTION AD. PRICES CASH, FOB PRESTON. WE CLOSE AT 2:00 ON SATURDAYS & MONDAYS. ROSS DISTRIBUTING COMPANY, 78 SOUTH STATE, PRESTON, IDAHO 83263 (208) 852-0830.

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IC-271H 100w 2m FM/SSB/OW Xcvr ..... Call
IC-271A 25w 2m FM/SSB/CW Xcvr. .$699.00 Call
IC-471A 10w430-450 SSB/CW/FM Xcvr $799.00 Call

IC-02AT Call
IC-04AT Call
IC-2AT Call
IC-3AT Call
IC-4AT Call

IC-R71A GENERAL COVER RCVR

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TS-930S/AT	$1799.00	Call
TS-930A	$1599.00	Call

TS-711A TS-811A ..... Call

TR-2600A Call
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TH-21AT Call
TH-41A Call
TH-41AT Call

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FT-726R ..... $ 899.00 Call

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CIRCLE 72 ON READER SERVICE CARD

MCINTOSH AUDIO EQUIPMENT bought, sold, traded. Steve Rowell, POB 176, Walton, NY 13856 (607-865-7200 8 am– 5 pm EST Mon-Fri.

HF QRP KIT, 5 watts output on 40, 30, 20 meters, $39.95 plus $2.00 shipping includes one crystal, your choice of 7.035, 7.125, 10.108, 10.125, or 14.035 MHz. Write for full data and schematic. RF KIT Co., Box 27127, Seattle, WA 98125.

PHELPS DODGE DUPLEXERS for two meters. Model #497, 6 cavity, $600 each. HAL ID-1A Repeater ID'er, 19″ rack mount, 110V power supply, $50. VHF Engineering two meter repeater complete with logic, $325. K1KYI, Richard Fairweather, Harrisville, RI 02830 (401-568-3468 between 8–9:30 pm EDT).

COCO SOFTWARE by dataLOG! Comprehensive logbook program DXCC/WAS Database, CoCo MORSE w/interface, Disk Utilities. Write or call for free catalog. dataLOG SOFTWARE, WA4FNG, P.O. Box 10531, Jacksonville, FL 32247 (ph. 904-396-6572).

LET THE WORLD KNOW what you would really rather be doing! Get your "I'd rather be DX'ing" bumper sticker with "Amateur Radio" written down the sides. Red and black, vinyl, and removable, so it won't hurt your car. $2.00 plus 50¢ postage to: Bumper Sticker, P.O. Box 6349, Evansville, IN 47712.

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BURGLAR ALARMS: BOOMING BUSINESS: GET IN NOW Business-Residential. Systems easily learned. INFORMATION $2.00 (redeemable). SECURITY ELECTRONICS INTERNATIONAL, P.O.B. 1456-QS, Grand Rapids, MI 49501.

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UNIVERSITY HAM CLUB needs QST from 1980, CQ from 1976, oldies, selected HR & 73. Tax deductible! Bob May, ET-SU ARC, Box 19060A, Johnson City, TN 37614.

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ESTATE SALE for the family of N5CIP. All equipment in mint condition, some brand new: TR7, PS7, R7, MN2000, MN2700, WH7, P75, SP75, HAL DS3100ASR, ST6000, AEA150, IC271H, SPS20, TB5EM and other parts. Send SASE for complete list. Call KD5E 409-632-5625 or 409-634-43173.

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FOR SALE: German hand Morse keys as used during WWII by the German army. 40 years old and in very good shape. Screws for adjustments in brass, silver contacts. Cord line with 2-pole plug, black plastic case, and hinged cover. Old emblem in the main base. Weight: 0.8 lbs. Measurements: 3.1″ × 1.6″ × 5.8″. Each $35 incl. seamail. New keys from GDR. Black plastic case, hinged cover with label. Screws in nickel-plated steel, built-in steel plate. Without cord line. Weight: 0.88 lbs (2.5″ × 1.9″ × 5.3″). Each $16 incl. seamail. Ask for pictures. Payment with bank draft. Klaus Gramowski, DL7NS, Kaiserin-Augusta-Allee 91, D-1000 Berlin 10, West Germany.

NOVICE RADIO OUTLET New and used equipment dealer catering to the beginner in amateur radio! October Special! AEA's MORSE UNIVERSITY for the C-64, $38.95: 919-286-7927. 1604 Delaware Ave., Durham, NC 27705.

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AMATEUR RADIO EQUIPMENT. Three generations of radios that must be sold. All either new, like new or mint. Original cartons, manuals, accessories, etc. Signal One Transceiver Model CX7, new $700; CX7B, Speaker, new ltrs, parts mint, $750. Collins linear 30S1, $1,495; 30L1 linear, $349; 62S1, $450. Drake Cline factory sealed cartons, never used $849; SB220, $400. Tempo 2 mtr 2002 two kilowatt desk top, $500. KWM2A, $675; KWM2, $575. Collins KWM380, new $2,500. Collins 75S2, $250. 75A4, $300. Collins 516-F2, $100. 312B4 $150. Send for list, there is much more. I will answer every inquiry. Also will ship anywhere in the free world. Mike, P.O. Box 0280, Baldwin, New York U.S.A. 11510.

TENNATEST: Antenna noise bridge outperforms others, accurate, costs less, satisfaction guaranteed. 1–150 MHz. Send stamp for details. W8URR, 1025 Wildwood Rd., Quincy, MI 49082.

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FOR SALE: Three 572B, used less than 5 hours, $25 each. Two 811 new $15 both. John Guthrie, W3GJ, St. Marys, PA 15857.

ICOM 730 with PS-45 supply. Like new, only 36 "On-Air" hours. Must sell—$495.00. N6JPH, 702-827-2266.

SELL: Pkg 1, exc. and new condx, Kenwood TS430S, PS430, SP430, $750 firm. Pkg2, HBX 48′ tower, 15 ft. Schedule 80 mast, Alliance rotator, thrust bearing, Ant. Mart 7-position switch box, Cushcraft A-4 beam, $700 firm. Both pkgs $1400 firm. All new condx. Call 704-541-3368. You ship or pick up.

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CLANDESTINE CONFIDENTIAL NEWSLETTER: Latest info on secret broadcasters. Six issues, $10 US, $13 foreign, US funds. RR4 Box 110, Lake Geneva, WI 53147.

WANTED: Uniden CR-2021 General Coverage Communications Receiver. WB2IMB, Tom Chwalek, 205 Herbert St., Syracuse, NY 13208.

SELL: Hy-Gain 18HT $225. 160 coil $20. Palomar Eng RX noise bridge $45. All new not used. Joe Bedlovies, 241 Dover St., Bridgeport, CT 06610

FOR SALE: Robot Model 400 (SSTV converter), RCA TV-1000 B&W camera, Sanyo 9″ B&W monitor $450 total + UPS Drake MN-2000 ant. tuner, excellent condx. $200. Drake TR-33C, $85. Regency HR2B XCVR for 2 meters, $35. Kenwood TR-7950 radio only & mike, $275. Robot Model 70 monitor, converter, $95 B&W dummy load, $95. Mirage B-108 amplifier, $110. PC-1 Kenwood phone patch, $40. Bearcat $60 scanner, $125. Astatic D-104 mike, $35. Coleco cassette tape recorder (mfg by GE) $15 (new). Heathkit power/SWR xtr, $25. Heathkit VHF wattmtr $25. Please include UPS to all pricing. Contact: K3UKW, 1609 So. Iseminger St. Phila., PA 19148 (215-271-8898).

CX7 with many improvements, $3400. Mark Mandelkern, KN5S, 2315 Derby St., Berkeley, CA 94705 (415-549-9210).

NEED BASKETCASE LINEAR(s) 30L-1, SB-200, etc. Price first letter, please. AA4DF, POB 13322, Tallahassee, FL 32317.

WANTED: SBE 33 or 34 in good condition with manual. W1BLR, R1 Box 75, Gilmanton, NH 03237.

SELL: Info-tech keyboard, Model 150, $150 or will trade for general-coverage receiver. Joseph Schwartz, 11 Windhar Loop, 1JJ, Staten Island, NY 10314 (718) 698-6069.

WANTED: Drake L-7, WH-7, ICOM IC-551D/FM, IC-PS35, IC EX-241, Astron RS-35, Ten-Tec 229, Daiwa CN540. K0MK 690 Vermilion Trail, Gilbert, MN 55741.

MINT IC-02AT, spare BP-3, AEA mike, $259. TR-7800, KPS-7 $259. Yaesu FC-700 80–10 tuner, $79. K1LEC, N. Springfield VT 05150-0073 or (802) 886-8121.

WANTED: 2–3 sections of Rohn 11 tower. State price and con dition. KA9FCZ via Callbook.

SELL: Ten-Tec Argonaut 505 & PS $210.00 mint. SASE for list Joe Bedlovies, 241 Dover Street, Bridgeport, CT 06610.

NOW HEAR THIS! Rockbound Novice needs clean operable HG-10B or HA-5 VFO. Ed Kelly, KA0RKJ, 2109 Buena Vista Drive, Greeley, CO 80631 (303-330-7323).

HEATH VTM $10, Electronc Scope Switch $5, H.P. Chart Recorder $35, H.P. 415-B SWR meter $70, SASE for large list. K6KZT, 2255 Alexander, Los Osos, CA 93402.

DEMAND ATTENTION on 80 and 160 meters. Rush $2.50 to Discage, Box 125, Holton, KS 66436, for details by return mail.

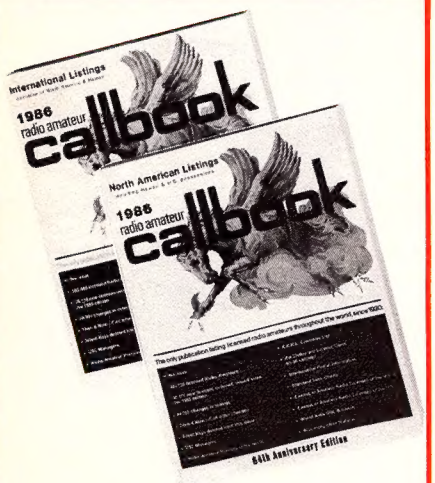
NAVY TYOE RCK Radio Receiver, RCA reconditioned, 115–156 MHz AM, mint condition, best offer. R.W. Boyd, Box 793, Stn "A," Montreal, Quebec, (514) 481-4830 after 18:00 hrs.

NATIONAL RADIO equipment manual and NCL-2000 parts lists SASE. Maximilian J. Fuchs, 11 Plymouth Lane, Swampscott, MA 01907.

WANTED: YAESU FR-100 SD or D receiver, M-28 stunt box, and Teletype "windfall" enclosure. C.T. Hunt, 130 Hunter St., Tiffin, OH 44883

WANTED: Shortwave Craft Magazines any issues. Sell 40 year collection of vacuum tubes. Send list of needs. M. Leavy 4141 Krupp Drive, Apt. 1, E.P. TX 79902.

1986 CALLBOOKS



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CIRCLE 162 ON READER SERVICE CARD

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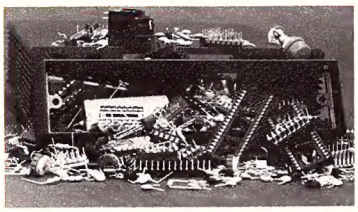

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Advertiser's Index

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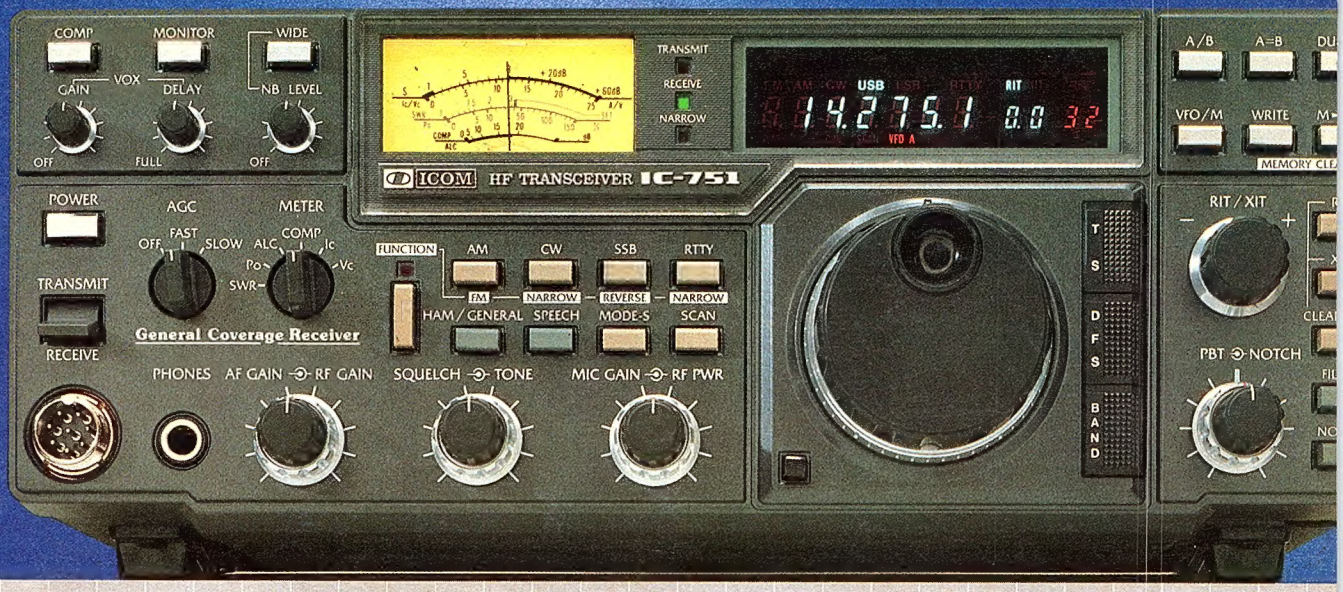
Prices and specifications subject to change without notice.

CIRCLE 34 ON READER SERVICE CARD

ICOM HF Transceiver IC-751



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FILTER SPECIFICATIONS

Filter	Model	Center Freq. (KHz)	-6dB (KHz) Width
STANDARD FILTERS			
AM Ceramic	CFW 455 IT	455	6.0
SSB (PBT) XTAL	FL-30	9011.5	2.3
FM Filter	9M15A	9011.5	15 (-3dB)
SSB Narrow (Hygrade Crystal)	FL-44A	455	2.4
OPTIONAL FILTERS			
CW Narrow	FL-52A	455	0.500
CW Narrow	FL-53A	455	0.250
SSB Wide	FL-70	9011.5	2.8
CW Narrow	FL-32	9010.6	0.500
CW Narrow	FL-63	9010.6	0.250
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